

UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

BOSTON SCIENTIFIC CORPORATION)	
BOSTON SCIENTIFIC SCIMED, INC.;)	
BOSTON SCIENTIFIC LIMITED; and)	
ENDOVASCULAR TECHNOLOGIES, INC.,)	
)	
Plaintiffs)	CIVIL ACTION NO.
)	1:10-cv-11646-DPW
v.)	
)	
COOK INCORPORATED; WILSON-COOK)	
MEDICAL INC.; COOK MEDICAL)	
INCORPORATED; COOK IRELAND LTD.;)	
TAEWOONG MEDICAL CO., LTD;)	
CHEK-MED SYSTEMS, INC. d/b/a GI)	
SUPPLY; STANDARD SCI-TECH INC.;)	
ENDOCHOICE, INC.; and SEWOON)	
MEDICAL CO., LTD.,)	
)	
Defendants.)	

MEMORANDUM AND ORDER
REGARDING CLAIM CONSTRUCTION
April 22, 2016

Table of Contents

I. BACKGROUND.....	4
II. PRINCIPLES OF CLAIM CONSTRUCTION.....	7
III. CLAIM CONSTRUCTION.....	8
A. The Pulnev Patents	8
1. "thread" and "threads"	8
2. "elongate[d] element[s]" and "elongate member"	16
3. "helix," "helical," "opposite senses of helix,"	17
"opposite helical lines," "common direction of winding," and	
"opposite to the first direction"	17
4. "interlaced," "interlacing pattern," and "interwoven" .	30
5. "configured to slide with respect to one another"	35
6. "a shape and orientation substantially different from	
shape and orientation of any of the elongated elements"	40
7. "free ends" and "said first and second ends"	48
8. "mesh structure"	50
9. "merging sections," "bending points," "bend(s),"	53
"connection elements," "curvilinear segment," and "circle arc	
segment"	53
B. The Hankh Patents	63
1. "truncated conical segment" and "truncated conical	63
portion"	63
2. "intermediate segment" and "second tubular segment" ...	69
3. "distal segment" and "third tubular segment"	75
4. "the steep angle varies along the truncated conical ...	82
segment in the longitudinal direction," "the steep angle	
increases along the truncated conical portion in the proximal	
direction," "the steep angle varies along the second tubular	
segment," and "the steep angle increases in the proximal	
direction along the second tubular segment"	82
5. "strand," and "a first strand and a second strand"	88
6. "radial force"	91

7. "wound helically," "wound in opposite directions," and "a strand wound helically in a direction [different from the first direction]"	94
8. "interbraided"	98
9. "are selected to facilitate a placement of the tubular wall at a junction of the esophagus with the stomach"	101
C. The Thompson Patent	105
1. "circumscribing the stent over substantially the entirety of said axial length"	105
2. "open weave construction"	109
3. "braided helical strands"	112
IV. CONCLUSION.....	115
V. APPENDIX: CLAIM CONSTRUCTION SUMMARY.....	116
A. Pulnev Patents	116
B. Hankh Patents	122
C. Thompson Patent	128

Plaintiffs Boston Scientific Corporation; Boston Scientific Scimed, Inc.; Boston Scientific Limited; and Endovascular Technologies, Inc., bring this suit against Defendants Cook Incorporated; Wilson-Cook Medical Inc.; Cook Medical Incorporated; Cook Ireland Ltd.; Taewoong Medical Co., Ltd.; Chek-Med Systems, Inc. d/b/a GI Supply; Standard Sci-tech, Inc.; Endochoice, Inc.; and Sewoon Medical Co., Ltd. for infringement of ten United States Patents related to medical stents. Before me are the parties' respective briefs¹ regarding the construction of several claim terms in the patents.

I. BACKGROUND

Plaintiffs allege infringement of United States Patent Nos. 6,007,574 ("`574 Patent"); 6,309,415 ("`415 Patent"); 7,160,323 ("`323 Patent"); 7,419,502 ("`502 Patent"); 7,419,503 ("`503 Patent"); 7,736,386 ("`386 Patent"); 7,763,068 ("`068 Patent"); 6,533,810 ("`810 Patent"); 6,818,015 ("`015 Patent"); and 5,876,448 ("`448 Patent"). Both parties address the patents in groups characterized by common inventors and similar specifications, and both address the disputed terms as having the same meaning when used in any of the patents within a given group. The parties label the `574 Patent, the `415 Patent, the

¹ Plaintiffs briefed the issues jointly, submitting one preliminary claim construction brief and one reply brief on behalf of all. Defendants did the same.

'323 Patent, the '502 Patent, the '503 Patent, the '386 Patent, and the '068 Patent as the "Pulnev Patents." They similarly label the '810 Patent and the '015 Patent as the "Hankh Patents." Finally, they label the '448 Patent as the "Thompson Patent." In light of this protocol among the parties, I adopt the same nomenclature and assumptions regarding claim construction within each group.

The United States Patent and Trademark Office ("PTO") issued the **Pulnev Patents** on various dates between December 28, 1999, and July 27, 2010. The Abstract of each of the Pulnev Patents explains that the Patent teaches:

[a] stent shaped as a three-dimensional body which is formed by interlaced threads (1) arranged in multistart turns of a helical line. The threads (1) are arranged in at least two groups (2 and 3) of the helical turns featuring opposite senses of helix. The stent ends are established by sections (5) where the turns of one helical line merge into those of the other helical line, said sections appearing as a single length of the thread (1).

Abstract, Pulnev Patents. The numbers in parentheses refer to labels on a set of five figures incorporated within the specifications of each of the Pulnev Patents.

The PTO issued the **Hankh Patents** on March 18, 2003, and November 16, 2004. The Abstract of each of the Hankh Patents explains that the Patent teaches:

[a] stent having a flexible self-expandable braided tubular wall having a proximal segment having an outer diameter, and a distal segment having an outer diameter smaller than the outer diameter of the proximal segment. An

intermediate segment is formed between the proximal and distal segments, which forms a truncated cone of which the base is forming the proximal end of the intermediate segment and of which the top is forming the distal end of the intermediate segment. A covering layer is arranged within the tubular wall.

Abstract, Hank Patents. The specifications of the two Hankh Patents are materially identical.

The PTO issued the **Thompson Patent** on March 2, 1999. The Abstract of the Thompson Patent explains that the Patent teaches:

A radially self-expanding stent particularly suited for treating esophageal strictures, includes a medial region and proximal and distal cuffs having diameters greater than the medial region diameter when the stent is in the relaxed state. A silicone coating circumscribes the medial region, but the cuffs are not coated and retain their open weave construction.

Abstract, Thompson Patent. The Abstract also describes a "deployment device" and a "low durometer sleeve." *Id.* The written description explains that "in accordance with the present invention, a radially self-expanding stent can be positioned accurately at a desired treatment site within a body lumen, based on an accurate positioning of the interior tubing or other stent delivery means. The stent may be allowed to radially self-expand over the majority of its axial length, and yet be retracted if necessary or desired, all while its axial position with respect to the delivery tool is maintained."

Thompson Patent at 4:21-28.

II. PRINCIPLES OF CLAIM CONSTRUCTION

A patent must include "one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention." 35 U.S.C. § 112(b). The construction of those claims "is exclusively within the province of the court." *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 372 (1996). "As a general rule, claim terms should be given their ordinary and customary meaning to persons of skill in the art as of the effective date of the patent application." *Eon-Net LP v. Flagstar Bancorp*, 653 F.3d 1314, 1320 (Fed. Cir. 2011).

To interpret the terms in a claim, "we look to the words of the claims themselves, the specification, the prosecution history, and any relevant extrinsic evidence." *Retractable Technologies, Inc. v. Becton, Dickinson and Co.*, 653 F.3d 1296, 1303 (Fed. Cir. 2011). "[T]he claims themselves provide substantial guidance as to the meaning of particular claim terms." *Abbott Laboratories v. Sandoz, Inc.*, 566 F.3d 1282, 1288 (Fed. Cir. 2009) (quoting *Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005)). "A patent's specification provides necessary context for understanding the claims," and "sometimes the specification offers practically incontrovertible directions about claim meaning." *Id.* The final piece of "intrinsic evidence," the prosecution history, "can inform the

meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it would otherwise be.” *Phillips*, 415 F.3d at 1317.

Courts may also consider “extrinsic evidence,” which is evidence outside of the patent and prosecution history, including dictionaries, treatises, and expert testimony. *Id.* at 1318. Although “extrinsic evidence can help educate the court regarding the field of the invention and can help the court determine what a person of ordinary skill in the art would understand the claim terms to mean,” *id.* at 1319, it is “less reliable than the patent and its prosecution history.” *Id.* at 1318. Thus, extrinsic evidence is “unlikely to result in a reliable interpretation of patent claim scope unless considered in the context of the intrinsic evidence.” *Id.* at 1319.

III. CLAIM CONSTRUCTION

A. The Pulnev Patents

1. “thread” and “threads”

The claims of the ‘574, ‘323, ‘502, ‘503, ‘386, and 068 Patents all refer to “thread” and/or “threads.” Plaintiffs contend that “thread” means “portion of wire” and “threads” means “portions of wire.” The Defendants contend that “thread”

means "length of material that is not a monofilament" and "threads" means "two or more threads."

In support of their proposed construction, Defendants offer definitions culled from several dictionaries. First, *Textile Terms and Definitions* 254 (8th ed. 1988) ("*Textile Terms*") defines "thread" as, inter alia, "[t]he result of twisting together in one or more operations two or more single, folded, or cabled yarns." Similarly, *Random House Webster's College Dictionary* 1389 (1991) ("*Webster's College Dictionary*") defines "thread" as, "a fine cord of flax, cotton, or other fibrous material spun out to a considerable length, esp. when composed of two or more filaments twisted together." Finally, *Webster's Third New International Dictionary* 2381 (1993) ("*Webster's Third Dictionary*") defines "thread" as, "a filament, a group of filaments twisted together, or a filamentous length formed by spinning and twisting short textile fibers into a continuous strand."

These definitions refer to the wrong art. The art relevant to the patents in this case is that of medical stents, not textile manufacturing. It is implausible that Plaintiffs' patents claim only medical stents made of yarn. Plaintiffs' expert, Dr. Charles Taylor, has stated that the textile arts are an unrelated field and Defendants have offered no compelling rebuttal. Taylor Reply Affidavit ¶ 11. The Defendants point

only to other terms related to the textile arts that are used in the Pulnev Patents, such as "interlaced" and "interwoven," and to expert testimony that such braided stents are created using machines similar to textile braiders. However, the use of terms like "interlaced" and "interwoven" does not indicate that the material that is interlaced or interwoven in stents is the same material that is interlaced or interwoven in textiles.

Likewise, the fact that a medical professional making a stent may have used a tool common to the textile industry does not change the lexicon relevant to this case from a medical one to one regarding textile manufacturing. A textile manufacturer does not have ordinary skill in the art of making medical stents because the two arts share a common tool. We would not look to a construction worker's understanding of terms in a patent related to orthopaedic surgery simply because both professions use drills and saws, and the same is true in this case.

Dr. Taylor has further stated that he is unaware of any self-expanding stent that is not made of monofilaments and that he believes that such a stent would be insufficiently elastic and therefore ineffective. Taylor Reply Affidavit ¶¶ 4-5. Defendants do not rebut this assertion. Defendants have thus failed to show that a person of skill in the art would believe that the term "thread" as used in the Pulnev Patents refers to a "length of material that is not a monofilament."

By contrast, Plaintiffs' argument that a "thread" is a "portion of wire" is rooted in the claims, specifications, and prosecution histories of the Pulnev Patents as well as in supporting extrinsic evidence in the form of expert opinion and relevant art.

The specification of the '574 Patent teaches that in prior art the threads of a stent were often joined by "welding, soldering or other similar means". See '574 Patent at 3:7-10 ("[I]nstead of joining the threads at both ends of the stent by welding, soldering or other similar means, [in the present invention] these ends are connected by curvilinear segments made of the same piece of thread."). Welding, soldering, and similar means are techniques for joining pieces of metal, such as wire, not fibrous material, such as yarn. The specification thus teaches that "threads" are made of a metallic monofilament.

The specification of the '574 Patent also discusses prior art in which "[t]he thread is made of a material featuring the SME." '574 Patent at 2:38-39. The specification defines SME as a "shape memory effect." *Id.* at 1:53. Dr. Taylor explains in his affidavit that shape memory effect "is a term generally associated with certain metallic alloys." Taylor Reply Affidavit ¶ 9. Similarly, the specification discusses a preferred embodiment of the invention in which "the stent is made of a material possessing a SME or of a superelastic

material." '574 Patent at 4:16-18. Dr. Taylor states that both SME and superelastic "are terms that are almost always associated with various metallic alloys." He further explains that metallic alloys "are types of materials that would be used to form 'wire.'" Taylor Reply Affidavit ¶ 9.

The patent prosecution history of at least one of the Pulnev Patents also supports Plaintiffs' interpretation. During the prosecution of the '574 Patent, the patentee argued:

In contrast to [the] Palmaz [prior art], at least some elongated helical members . . . of the present invention merge into each other, that is at least some selected pairs of these elements are made from *a single piece of wire, or a thread*, and that elements of each selected pair are joined together by a connecting portion of the same thread.

(emphasis added). Van Eman Decl., pg. 81. The patentee thus referred to wire and thread interchangeably.

The Defendants contend that this portion of the prosecution history of the '574 Patent "confirms that the applicants knew perfectly well the distinction between 'wire' and 'thread.'" I disagree. If the applicants had intended to treat the "single piece of wire" and the "thread" as separate and distinct entities, they would have completed the phrase "elements of each selected pair are joined together by a connecting portion of the same . . ." with "wire or thread," not, as they did, only the single word "thread." The applicants used the phrase "connecting portion of the same thread" to refer back to the

previous phrase "a single piece of wire, or a thread." The sentence structure demonstrates that "a single piece of wire, or a thread" was not used to describe two separate materials, but instead two alternative labels for the same material.

Defendants argue that the manner in which the specification of the '574 Patent distinguishes prior art stents indicates that "thread" does not mean "wire." The specification states:

One more stent embodiment presents its construction as a hollow tubular element established by the coils of a wire or the turns of a strip. The construction of such a stent is more elastic since the stent is deformable both radially and axially.

However, with this stent it is not always possible to provide an optimum value of the pitch of spring coils or of strip turns because with too a large pitch a uniform pressure distribution over the surface being prosthesisized is affected, which may result in partial vessel stenosis, whereas in the case of too a small pitch stent implantation may cause hyperplasia of the intima of the vascular wall in the organ under reconstruction, as well as early thrombotic complications.

'574 Patent at 1:65-2:11. Defendants argue that the use of the word "wire" in the specification indicates that the word "thread" in the claims does not mean "wire."

To the extent that the Defendants cite to this portion of the specification in support of the proposition that all wire stents were disclaimed, it is clear from the specification that it was not the wire material - the problematic stent embodiment could also be made of "the turns of a strip" - that the patentees distinguished but instead the form taken by the wire

or strip in that particular embodiment. To the extent that Defendants cite to this portion of the specification in order to argue that the patentees knew the word wire and "[i]f the patentees wanted to claim a stent made from wire, they could have done so," this is not a compelling argument. If "thread" and "wire" are used interchangeably in the field, then the choice to use one synonym does not disclaim the other.

Plaintiffs' construction, however, does not interpret "a thread" to mean "a wire" but rather "a portion of wire." The claims indicate that the term should be construed to mean a "portion" of wire because of the way in which the claims relate the terms "thread" and "threads." Claim 1 of the '323 Patent teaches "a three-dimensional body whose surface is formed by at least two groups of turns made of interlaced elastic threads," '323 Patent at 6:32-34, and Claim 2, which is dependant on Claim 1, teaches that "the turns of all helical lines are made of a single segment of the thread," *id.* at 6:42-43. By including the word "portion," the Plaintiffs' construction accommodates the language of the claims teaching an invention that may simultaneously be composed of both multiple "threads" and one "thread" by interpreting the invention to be composed of smaller "portions of thread" within one larger "portion of thread."

Plaintiffs bolster the intrinsic evidence with extrinsic evidence in the form of an affidavit by their expert, Dr.

Taylor, who states his opinion that "threads" refers to portions of wire because self-expanding stents are generally made from wire. Taylor Affidavit ¶ 13. He supports this opinion with three articles relating to self-expanding metal stent designs, each of which refers to stents made of "a single thread of . . . nitinol wire." See Ko, G. et al, *Obstruction of the Lacrimal System: Treatment with a Covered, Retrievable, Expandable Nitinol Stent versus a Lacrimal Polyurethane Stent*, 227 Radiology 270, 270 (2003); Song, H. et al., *Covered Retrievable Expandable Nitinol Stents in Patients with Benign Esophageal Strictures: Initial Experience*, 217 Radiology 551, 551 (2000); Jung, G. et al., *Malignant Gastroduodenal Obstructions: Treatment by Means of a Covered Expandable Metallic Stent-Initial Experience*, 216 Radiology 758, 758 (2000).

Defendants do not refute Dr. Taylor's assertion. Instead, the Defendants challenge the relevance of Dr. Taylor's expert opinion. The Defendants contend that "Dr. Taylor does not even attempt to provide the perspective of a person of ordinary skill in the art in 1993, nor has he demonstrated that he is qualified to even render an opinion on this point" because he "has not demonstrated that he himself had any experience with stents, or, indeed, any medical device as of 1993."

However, Defendants have not demonstrated that the understanding in the relevant field of the term "thread" changed

between 1993 and the present, nor presented any expert testimony that the meaning of the term was anything other than the definition Dr. Taylor advanced. While Dr. Taylor's affidavit would have been even more convincing had he expressly and directly addressed the meaning of thread in the field as of 1993, his statements regarding the term's meaning thereafter remain relevant to its past meaning, and Defendants have not raised any challenge to undermine that relevance. I therefore decline Defendants' invitation to disregard Dr. Taylor's affidavit and his opinions.

In light of the evidence that the Plaintiffs have marshaled from the claims, specifications, and patent prosecution histories of the Pulnev Patents, as well as the extrinsic evidence that they present in support of their interpretation, I construe "thread(s)" to mean "portion(s) of wire."

2. "elongate[d] element[s]" and "elongate member"

Both parties agree that the terms "elongate[d] element[s]" and "elongate member" should have the same meaning as "thread(s)." In large part, I agree, because the elongated elements are composed of thread. See '574 Patent at 6:28. However, not every thread in the claimed inventions makes up an elongated element.

The term "elongate[d] element[s]" is used only to describe the threads making up the side surface of the stent. The term

"thread," by contrast, is used to describe all portions of wire in the stent. For example, in Claim 1 of the '574 Patent, the "side surface" is described as "being formed by two groups . . . of elongated elements." '574 Patent at 6:25-27. The claim also describes "connecting elements" that are formed as "curvilinear segment[s]." These "connecting elements are described as distinct from the "elongated element[s]" and yet also made of thread. '574 Patent at 6:44-49.

In light of my construction of "thread(s)" and the necessary distinction between "elongated elements" and "connecting elements," I construe "elongate[d] element[s]" and "elongate member" to mean "portion(s) of wire forming the side surface."

3. "helix," "helical," "opposite senses of helix," "opposite helical lines," "common direction of winding," and "opposite to the first direction"

The claims in each of the Pulnev Patents incorporate one or both of the terms "helix" and "helical." For example, numerous claims in the Pulnev Patents teach threads with a "helical configuration" or threads that are "arranged along helical lines having opposite senses of helix." See, e.g., '574 Patent at 6:29; '323 Patent at 6:34-35; '502 Patent at 6:38-39.

Plaintiffs contend that "helix" should be construed to mean "spiral form or structure" and that "helical" should be construed to mean "approximating a helix." Defendants contend

that both terms should be construed to mean "a smooth, continuously-spiraling, three dimensional curve that lies on a cylinder or cone and follows a path having one of either a consistent left-handed or right-handed screwing motion."

Plaintiffs argue that language within the claims supports their construction because many of the asserted claims require that threads be "arranged along helical lines having opposite senses of helix." See, e.g., '323 Patent at 6:34-35.

Plaintiffs contend that "[s]uch language makes clear that a complete helix extending from one end of the stent to the other in a 'continuously spiraling path,' as alleged by Defendants, is not required by the claim" because "[a] thread can be 'arranged along helical lines' without continuing along the same line indefinitely." This argument fails because it does not address the relevant term. Even if threads can be "arranged along helical lines" without continuing along the same lines indefinitely, the modification applies to what it means to be "arranged," and how long an "arrangement" must continue, instead of what it means to be "helical." The phrase "arranged along helical lines" does not illuminate the definition of "helical."

Defendants' argument based on the claims is similarly unavailing. Defendants contend that the claims support their construction because many of the asserted claims refer to the threads in helical configurations as having a "direction of

winding," see, e.g., '574 Patent at 6:30 or "having opposite senses of helix," see, e.g., '323 Patent at 6:36. Their contention is also based on similar terms in the specification, which describe "turns of a helical line and . . . at least two groups featuring opposite sense of the helix line." '574 Patent at 2:65-3:3. Defendants argue that a path would not have a "sense" or a "direction" unless it is actually wound into a helix. This argument is conclusory. A line need not be "smooth" and the spiral need not be "continuous" to be considered a spiral or for the spiral to have a general "direction."

Defendants additionally contend that their construction must be adopted because U.S. Patent No. 4,733,665 ("Palmaz Patent"), cited in the background section in each of the Pulnev Patents, see, e.g., '574 Patent at 1:34, distinguishes between a "helical" pattern and a "zig-zag" pattern, see Palmaz Patent at 1:30-52. This argument fails for two reasons. First, although the Pulnev Patents refer to the Palmaz Patent, they do not state that terms used in the Pulnev Patents must be construed in the same manner in which they would be construed in the context of the Palmaz Patent. Instead, they merely distinguish the prior art presented in the Palmaz Patent (without referring to helices at all). Second, the Palmaz Patent itself does not define "helical" or explicitly state whether a form "approximating a

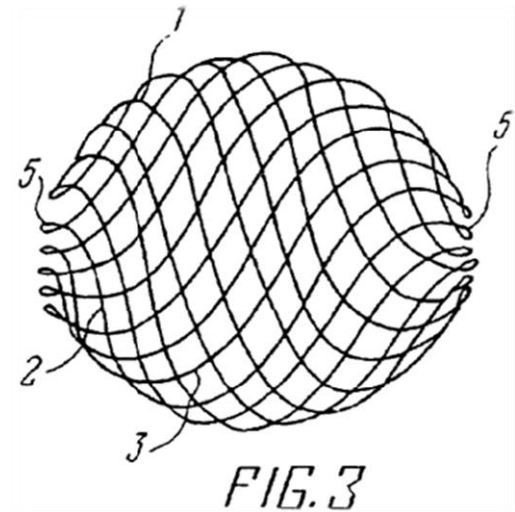
helix" would be "helical" under the claims of the patent. A line could approximate a helix, instead of a zig-zag, without being "smooth" and "continuous." The Palmaz Patent does not, on its face, require adoption of the construction that Defendants proposed.

Finally, Defendants contend that because each of the five figures presented in the Pulnev patents depicts a helix featuring a continually spiraling path without zig-zags or hooks, that every "helical" line under the claims must also feature those characteristics. However, each of the Pulnev Patents describes these figures only as "some illustrative embodiments" of the invention, see, e.g., '323 Patent at 4:65-66. They are not described as representing every possible embodiment. "[I]t is improper to read a limitation from the specification into the claims." *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 604 (Fed. Cir. 2004). "[M]ere inferences drawn from the description of an embodiment of the invention cannot serve to limit claim terms," *Johnson Worldwide Associates, Inc. v. Zebco Corp.*, 175 F.3d 985, 992 (Fed. Cir. 1999), and I will not use inferences drawn from the diagrammatic description of particular embodiments to limit the claim terms of the Pulnev Patents.

While Plaintiffs do not point to particular components of the claims or the specification in support of their own proposed

construction, they do argue that two of the illustrative figures demonstrate the inaccuracy of Defendants' proposed definitions. They contend that, based on these illustrations, the term "helical" as used in the claims cannot limit a helical configuration to either a "curve that lies on a cylinder or cone" or a "smooth, continuously spiraling" curve.

First, Plaintiffs argue that Figure 3 indicates that a "helical" configuration need not be a "curve that lies on a cylinder or cone." Figure 3 depicts lines that are arranged as if around a sphere and not as if around a cylinder or cone: Plaintiffs contend that Defendants' definition is therefore too limited.



Defendants respond that the '415 Patent distinguishes between "spherical" and "helical" embodiments. Claim 1 of the '415 Patent teaches a stent defined by a single elongate element without specifying the shape of the elongate element or of the body of the stent. '415 Patent at 6:26-31. Claim 2 teaches "[t]he device of claim 1, wherein said elongate element follows a helical line." *Id.* at 6:32-33. Claim 9 teaches "[t]he device

of claim 1, said body having a first end, a second end and a plurality of merging sections defining each of said first and second ends." *Id.* at 6:50-52. Claim 13 teaches "[t]he device of claim 9, wherein a central portion of said body has a cross-sectional profile that is much larger than a cross-sectional profile of said ends of said body." *Id.* at 6:60-62. Claim 14 teaches "[t]he device of claim 13, wherein said ends of said body are joined to provide the body with a generally spherical configuration." *Id.* at 63-65. Defendants argue that the separate language and embodiments in Claims 2 and 14 differentiate the spherical and helical configurations. I disagree.

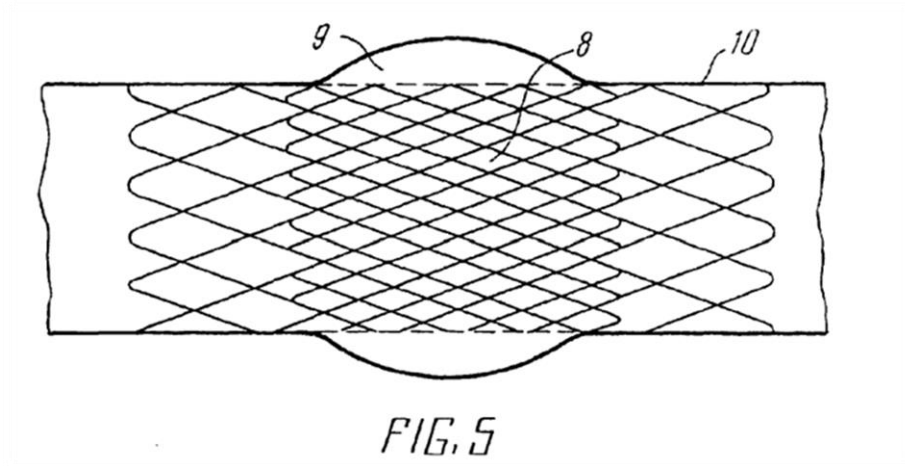
Claim 2 teaches any embodiment of Claim 1 in which the "elongate element follows a helical line." Without conclusorily accepting Defendants' definition of "helical," I must consider that, among other embodiments, the description in Claim 2 could include an embodiment of Claim 1 in which the "body" has "a generally spherical configuration." Similarly, Claim 14 teaches a variety of embodiments of Claim 1 in which the "body" has "a generally spherical configuration." Therefore, I must also consider that the description in Claim 14 could include an embodiment of Claim 1 in which the "elongate element follows a helical line." It is possible that the two claims are distinct but not mutually exclusive - that is, while each is applicable

to some embodiments that the other does not describe, certain embodiments are fairly described by both. Thus, the claims in the '415 Patent do not refute the Plaintiffs' contentions that a "helical line" can lie on a sphere as well as a cylinder or cone.

By contrast, the claims in the '574 Patent do clarify the relationship between a "helical" line and a spherical body. Claim 1 of the '574 Patent teaches that the side surface of the stent is formed of elongated elements "extending in a helical configuration." '574 Patent at 6:29. Every other claim in the '574 Patent is dependent on Claim 1. Thus, the wires in all embodiments of the claimed invention extend in a "helical" configuration, including the wires depicted in Figure 3, which the specification describes as an "illustrative embodiment[]", *id.* at 4:51-52, and in which body of the stent is spherical. The specification of the '574 Patent clarifies that "helical" lines can lie on a sphere and therefore cannot be limited to those that lie "on a cylinder or cone."

Plaintiffs' second argument, based on Figure 5, is less compelling. The Plaintiffs point to Figure 5, which each of the Pulnev Patents describes as depicting "a stent embodiment . . . provided with the additionally interwoven threads 1 on a section 8, which features a higher interlacing density of the threads

1." See, e.g., '415 Patent at 5:54-58. The numbers "1" and "8" refer to labeled sections of Figure 5:



The Plaintiffs contend that the interwoven threads in Figure 5 include bends along the stent body and that therefore the threads are not "continuously spiraling" as the Defendants' proposed definition requires.

Defendants contend that the "additionally interwoven threads" do not need to follow a helical path and therefore their configuration is irrelevant to the definition of "helical." I disagree. Claim 5 of the '574 Patent, utilizing the same identifying label "8" as the diagram, teaches "[t]he stent as set forth in claim 1, wherein a portion (8) of the side surface is provided with third and fourth groups of the elongated elements, the elongated elements of the third and the fourth groups being formed by an elastic thread and extending *in a helical configuration* along a longitudinal axis of the

body" '574 Patent at 6:58-63 (emphasis added). Thus the elongated elements making up the "additionally interwoven threads" as described in Claim 5 must indeed extend "in a helical configuration."

However, a close look at Figure 5 indicates that Plaintiffs' argument is nonetheless misleading. Plaintiffs point to the bends at the *ends* of the helical lines, which connect two lines spiraling in opposite directions. Plaintiffs present no reason to believe that these connecting elements are considered to be part of the "helical configuration." The bends do not extend "along a longitudinal axis of the body." *Id.* at 6:62-63. Claim 21 of the '502 Patent describes a stent with additionally interwoven elements in which "free ends of the elements are joined to the elements that form the bending points and/or to one another," '502 Patent at 7:40-42, indicating that the bends at the end of the additionally interwoven elements are not considered to be a part of the elements themselves but instead are connectors. Plaintiffs' argument based on Figure 5 is therefore unconvincing.

In addition to the intrinsic evidence above, both parties present dictionary definitions in support of their respective proposed constructions. Plaintiffs point out that *The American Heritage College Dictionary* 642-43 (4th ed. 2002) ("*American Heritage Dictionary*") defines "helical" as "[h]aving a shape

approximating that of a helix," and defines "helix" as "a spiral form or structure." Defendants point out that the same dictionary provides an alternate definition of helical as "[o]f or having the shape of a helix, spiral" and an alternate definition of "helix" as "[a] three-dimensional curve that lies on a cylinder or cone, so that its angle to a plane perpendicular to the axis is constant." Defendants gather similar definitions from *Webster's Third Dictionary* 1050 (defining "helical" as "relating to, or having the form of, a helix" and "something helical in form (as in a coil extension spring)" and defining "helix" as "something spiral in form," "a coil formed by winding wire around a uniform tube," and "a curve traced on a cylinder by the rotation of a point crossing its right sections at a constant oblique angle") and *Webster's College Dictionary* 621-22 (defining "helical" as "pertaining to or having the form of a helix; spiral" and defining "helix" as, inter alia, "a spiral" and "the curve formed by a straight line drawn on a plane when that plane is wrapped around a cylindrical surface of any kind, esp. a right circular cylinder, as the curve of a screw").

Given the lack of uniformity among the definitions, and the lack of reasoning regarding why any one of these definitions ought to be preferred over another, I cannot draw any conclusions from these dictionary entries. The Federal Circuit

has noted a common difficulty with the use of general dictionaries in construing technical terms: "it focuses the inquiry on the abstract meaning of words rather than on the meaning of claim terms within the context of the patent."

Phillips, 415 F.3d at 1321. That is precisely the trouble here. None of the dictionaries indicates which meaning is appropriate in the context of medical stents as discussed in the Pulnev Patents.

Plaintiffs offer the opinion of their expert, Dr. Taylor, to address the issue. Dr. Taylor states in his affidavit that "[i]n the stent field, we do not use the term 'helical' to mean that the wire forming the stent must continue in a single direction along the entire length of the stent. Rather, 'helical' could refer to a variety of configurations." Taylor Reply Affidavit ¶ 12. Dr. Taylor's affidavit supports a broader construction of the terms "helix" and "helical" than that provided by Defendants.

Defendants contend that Dr. Taylor's statements should be discounted in light of his affidavit submitted in support of Plaintiffs in a separate matter before Judge Stearns. In *Orbunsneich Medical Co. Ltd., BVI, v. Boston Scientific Corporation*, No. 1:09-cv-10962, Dkt. No. 110, Dr. Taylor submitted an affidavit stating:

For a "helical segment" to be a natural constituent of the stent, one of ordinary skill in the art at the time the patents-in-suit were filed would recognize that such a segment would have the mechanical properties of a helix. I do not believe that a person of ordinary skill in the art at the time of filing would understand the phrase "helical segments" as it is used in the asserted patents to mean any arbitrary line drawn around the stent in a helical direction. In fact, it was well known in the art at the time that such artificial paths having a helical direction could be drawn on nearly every stent ever designed.

Ex. EE, Taylor Affidavit ¶ 8. In its brief in the case before Judge Stearns, Boston Scientific argued that the "mechanical properties" of a helix must characterize a segment in order to make a segment helical, because otherwise a shape approximating a helix could be drawn atop the wires of almost any stent. Boston Scientific provided diagrams demonstrating how such patterns could be drawn.²

Dr. Taylor's affidavit in *Orbunsneich* may undermine the extremely loose definition proposed by Plaintiffs in this case (defining "helical" as merely "approximating a helix" (emphasis added)), but it does not contradict the affidavit that Dr. Taylor has submitted here. Dr. Taylor did not state in the *Orbunsneich* affidavit that a "helical" wire must continue in a single direction along the entire length of the stent. Even in

² Judge Stearns did not construe the terms in that case. On May 4, 2012 Judge Stearns cancelled the *Markman* hearing pending the PTO's reexamination of the five patents in suit. The case was terminated on June 4, 2012 pending the outcome of the patent reexamination.

its brief in *Orbunsneich*, Boston Scientific did not contend that the "mechanical properties" of a helix required a helical line to advance smoothly, continuously spiral, lie on a cylinder or cone, or follow a path having a consistent left-handed or right-handed screwing motion. Boston Scientific cited to the prosecution of a related European Patent in which Orbusneich had claimed a "substantially continuous winding . . . advancing substantially helically along a longitudinal axis of [a] tubular body." Ex. EE, p. 8. Boston Scientific did not quibble with the requirement of "substantiality."

Dr. Taylor's opinion that continuous winding in one direction is not a part of the understanding of "helical" in the field of medical stents is due some deference, particularly in light of the briefing submitted and prosecution histories discussed in *Orbunsneich*. While Dr. Taylor's affidavit in *Orbunsneich* undermines the term "approximating" as employed in Plaintiffs' proposed definition, it does not undermine the general proposition that he expresses, namely, that in the field of medical stents, "'helical' could refer to a variety of configurations" and is not limited to the narrow definition proposed by Defendants.

Although the evidence in the record regarding the meaning of "helix" and "helical" is notably thin, I construe "helix" to mean "a spiral form" and "helical" to mean "substantially in the

form of a spiral." Defendants have not shown that the particular requirements that they have incorporated into their definition are justified by the intrinsic or extrinsic evidence. The term "substantially" remedies the difficulty that Defendants have raised regarding Plaintiffs' proposed definition without contradicting the only expert opinion presented.

In light of these constructions, I also reject Defendants' proposed definitions for "opposite senses of helix," "opposite helical lines," "common [first/second] direction of winding," and "opposite to the first direction." Each of these proposed definitions incorporates the idea that a helical line must smoothly and continuously curve in a consistent screwing motion. Instead, I construe the terms as the Plaintiffs have proposed. I construe "opposite senses of helix" and "opposite helical lines" to mean "one helical direction and the other helical direction." I construe "common [first/second] direction of winding" to mean "common [first/second] direction of winding." I construe "opposite to the first direction" to mean "in the other helical direction." In light of the definition of "helical" as I have construed it, these terms do not require further construction.

4. "interlaced," "interlacing pattern," and "interwoven"

The claims in each of the Pulnev Patents incorporate one or more of the terms "interlaced," "interlacing pattern," and

"interwoven." Plaintiffs suggest that "interlaced" should mean "interwoven," "interlacing pattern" should mean "interwoven pattern," and "interwoven" should mean "woven." Defendants suggest that all three terms mean "arrangement in which a length of thread continuing in a direction passes alternatively over and under each successively encountered length of thread."

The parties support their proposed definitions of "interlaced" and "interlacing" with citations to various dictionaries. Plaintiffs note that *The American Heritage Dictionary* 723 defines "interlace" as "[t]o connect by or as if by lacing together; interweave." Defendants cite to three dictionaries, (1) *Webster's College Dictionary* 703 defining "interlace" as "to unite or arrange . . . so as to intercross one another, passing alternatively over and under; intertwine"; (2) *Webster's Third Dictionary* 1179 defining "interlace" as "to unite by or as if by lacing together," "to vary or diversify by alternation, interpolation, or intermixture," and "to cross one another as if woven together"; and (3) *Textile Terms* 255 defining "thread interlacing" as "[t]he arrangement of the warp and weft threads over and under one another," providing a note with an example in which the warp is "passing over three, under two, over one, and under two weft threads" and defines "weave, plain" as "[t]he simplest of all weave interlacings in which the odd warp threads operate over one and under one weft thread

throughout the fabric with the even warp threads reversing this order to under one, over one, throughout."

These definitions - even those offered by Defendants - support Plaintiffs' proposed definitions and refute Defendants'. As discussed above, *see supra* Section III(A)(1), textile dictionaries refer to an unrelated art, and are therefore unhelpful in construing the meaning of terms in a patent for medical stents. Furthermore, Defendants' cited definition in *Textile Terms* only includes the "one over, one under" pattern as "the simplest of all weave interlacings." The other dictionary definitions do not limit interlaced patterns to that particular pattern. And none of the definitions includes Defendants' requirement that the length of thread must continue in one direction.

Nor do the intrinsic records of the Pulnev Patents support the specific pattern advocated by Defendants. Neither the claims nor the specifications require that the "thread passes alternatively over and under each successively encountered length of thread." Defendants argue that if the lines did not alternately pass over and under each other, the resulting arrangement would not be interlaced or interwoven helical lines but instead one set of helical lines set on top of another. Defendants overlook the multiplicity of potential patterns that

might be described as interwoven or interlaced patterns, many of which do not follow the "one over, one under" pattern.³

Plaintiffs' expert Dr. Taylor further illuminates the meaning of "interlace," "interweave," or "weave" in the field of medical stents. In his affidavit, he explains that "[s]tents are known to have a variety of different weave patterns, and such patterns do not uniformly require 'thread(s)' forming the stents to continue in one direction without hooks," but instead "can include combinations of hooks, loops, and crossing portions." Taylor Reply Affidavit ¶ 15. He states that stents are "made using a variety of techniques, such as weaving, braiding, knitting, laser cutting[, and] stamping" and that "[t]he term 'interwoven,' as used in stent technology, identifies the method by which the stent was made, but does not

³ Plaintiffs argue that the specification indicates that the pattern suggested by Defendants is not required because the embodiment depicted in Figure 5 is manifestly not an over/under pattern - some of the threads in the figure form a bend along the stent body instead of going over or under an encountered thread. However, the bends in Figure 5 are at the ends of the interwoven strands, connecting two strands. Plaintiffs point to no part of the specification that indicates that the ends of the interwoven strands must also be interwoven. Indeed, Claim 21 of the '502 Patent describes a stent with additionally interwoven elements in which "free ends of the elements are joined to the elements that form the bending points and/or to one another." '502 Patent at 7:40-42. The bends shown in Figure 5 are those formed by the "free ends" of the interwoven elements, and are not "interwoven" themselves. While I ultimately agree with Plaintiffs' construction, their argument based on Figure 5 is unconvincing.

imply any specific weaving pattern.” *Id.* at ¶ 16. Dr. Taylor provides as an example a stent sold by Defendant TaeWoong that is described as including “D weaving technology.” The pattern in this stent includes wires hooking onto one another and does not conform to Defendants’ proposed definition of “interweaving.” *Id.* at ¶ 18.

In light of the dictionary definitions, Dr. Taylor’s affidavit, and Defendants’ failure to tether the limitations that they seek to impose to any part of the intrinsic or extrinsic evidence, I construe “interlacing” and “interlaced” as “interwoven.” Although Defendants protest that this definition “do[es] not clarify the actual meaning of the disputed term[],” they have not raised any intrinsic or extrinsic evidence to justify any limitations on the phrase “interlacing pattern.” Where no limitations are justified by the evidence, I will not import them in order to clarify a term that Defendants have not shown is in any need of clarification.

I will not, however, adopt Plaintiffs’ proposed definition of “interwoven” as simply “woven.” Plaintiffs have noted that the specifications of the Pulnev Patents use “interlacing” and “interwoven” interchangeably. *See, e.g.,* ‘574 Patent at 5:52-58 (describing Figure 5 as presenting a stent embodiment “provided with additionally interwoven threads . . . on a section . . . , which features a higher interlacing density of the threads . . .

."). Defendants similarly define "interlacing" and "interwoven" identically. Where "interlacing" and "interlaced" are defined as "interwoven," it is a puzzle to me why Plaintiffs would seek to define "interwoven" as "woven," so that the terms are no longer synonymous. Neither party has demonstrated that the term "interwoven" requires construction. I therefore decline to construe it.

5. "configured to slide with respect to one another"

Several of the Pulnev Patents teach that the crossing portions of the threads or elongate elements are "configured to slide with respect to one another." See, e.g., '502 Patent at 6:43-45. Plaintiffs contend that the phrase means "not fixedly secured with respect to one another." Defendants contend that it means "configured to move along the length with respect to one another." The primary point of disagreement between the parties' proposals is whether threads "configured to slide with respect to one another" would include threads that merely rotate or pivot with respect to one another.

The specifications of the Pulnev Patents indicate that Defendants' construction is unduly narrow. Each specification states:

In the case of longitudinal stent deformation the threads slide with respect to one another, with the result that the angle of their mutual arrangement changes, the stent diameter decreases and becomes equal

in length. Hence the stent diameter is much reduced, whereas its length changes but rather inconsiderably.

See, e.g., '574 Patent at 3:29-35. The specifications describe one situation in which "the threads slide with respect to one another," explaining that when the stent lengthens, the angles between the threads change so that the stent's diameter is minimized. Sliding is therefore not necessarily characterized by or limited to movement along the length of the threads. Pivoting or rotating, as the threads do when the angles between them change during longitudinal stent deformation, is sufficient to satisfy the "configuration to slide" limitation. Defendants' limitation of "along the length" is unwarranted in light of the words of the Pulnev Patents' specifications.

While this is the only part of the specifications addressing the term, both parties draw from prosecution history - in particular, the prosecution of the '415 Patent - in attempts to bolster their proposed definitions. During prosecution, the applicants added the phrase "wherein portions of said elongate element cross to define said interlacing pattern, and crossing portions being configured to slide with respect to one another" in order to resolve the patent examiner's objection that the claims were anticipated by the Palmaz Patent. Plaintiffs note that the Palmaz Patent states that "it is preferable that the plurality of elongate members .

. . are fixedly secured to one another where the elongate members . . . intersect with one another." Palmaz Patent at 6:36-40. Plaintiffs thus argue that because "configured to slide with respect to one another" must have been added to distinguish the Palmaz Patent with regard to that characteristic, the phrase must mean "not fixedly secured with respect to one another."

Plaintiffs disregard a basic rule of claim construction. "The problem with [their] argument is that there is no principle of patent law that the scope of a surrender of subject matter during prosecution is limited to what is absolutely necessary to avoid a prior art reference that was the basis for an examiner's rejection," *Norian Corp. v. Stryker Corp.*, 432 F.3d 1356, 1361 (Fed. Cir. 2005), such as surrendering only stents in which the elongated elements are "not fixedly secured with respect to one another" here. "To the contrary, it frequently happens that patentees surrender more through amendment than may have been absolutely necessary to avoid particular prior art. In such cases, we have held the patentees to the scope of what they ultimately claim." *Id.* at 1361-62.

The question here is not merely what was distinguished during the prosecution of the '415 Patent, but rather instead what the phrase "configured to slide with respect to one another" means in the context of the Pulnev Patents. While the

Fig. 1A

Fig. 1A is a schematic diagram of a diamond-shaped mesh structure. The structure is composed of a series of interconnected diamond-shaped cells. The top edge is labeled 70, and the right edge is labeled 73. The bottom edge is labeled 72. The left edge is labeled 77. The interior of the mesh is divided into two main regions: a central region labeled 71 and a side region labeled 75. The mesh is further divided into two main sections: a top section labeled 76 and a bottom section labeled 74. The width of the mesh is indicated by a dimension line labeled d .

Fig. 1B

Fig. 1B is a schematic diagram of a diamond-shaped mesh structure, similar to Fig. 1A. The structure is composed of a series of interconnected diamond-shaped cells. The top edge is labeled 70, and the right edge is labeled 73. The bottom edge is labeled 72. The left edge is labeled 77. The interior of the mesh is divided into two main regions: a central region labeled 71 and a side region labeled 75. The mesh is further divided into two main sections: a top section labeled 76 and a bottom section labeled 74. The width of the mesh is indicated by a dimension line labeled d' .

38

lengthwise with respect to one another; mere pivoting or rotating is insufficient.

It is unclear from Figure 1A and 1B whether the depicted elongated elements are fixedly secured to one another. Defendants point out that the specification only states that "it is preferable" that a plurality of the elongate members are fixedly secured to one another, Palmaz Patent at 6:36-40, which, of course, does not specifically *exclude* embodiments in which the elongate members are not fixedly secured. However, no part of the Palmaz Patent specifically *includes* the limitation that the elongate members must *not* be fixedly secured to one another. Thus, if Plaintiffs' construction is adopted, and the phrase is interpreted to mean only "not fixedly secured with respect to one another," it would have resolved the anticipation objection posed by the patent examiner.

Defendants also attempt to support their more limited construction of the phrase by reference to a dictionary. They cite *Webster's Third Dictionary* 2142, which defines "to slide" as "to go with a smooth continuous motion: glide." However, this definition does not require that the smooth movement be linear. Nothing in the definition excludes a smooth continuous rotation or pivot. Moreover, even if the definition did limit "sliding" in that way, it would exclude the more general use of "configured to slide" in the description of longitudinal stent

deformation included within the specification of each of the Pulnev Patents (described above). The dictionary definition cannot be used to exclude something impliedly included by the specifications. *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1584 (Fed. Cir. 1996) (extrinsic evidence may not "contradict the import of other parts of the specification.").

In light of the specifications, which indicate that rotating and pivoting are included among the ways that a thread may slide with respect to another thread; in light of the prosecution history of the '415 Patent, which indicates that elements configured to slide with respect to one another may not be fixedly secured to one another; and in light of the general definition of "to slide," which requires a smooth continuous motion, my construction is a combination of the parties' proposals. I construe "configured to slide with respect to one another" to mean "configured to move in a smooth continuous motion with respect to one another without being fixedly secured to one another."

6. "a shape and orientation substantially different from shape and orientation of any of the elongated elements"⁴

Claim 1 of the '574 Patent teaches that the elements

⁴ The full phrase that the parties address is: "curvilinear segment . . . having . . . a shape and orientation substantially different from shape and orientation of any of the elongated elements," but Defendants' objections are directed at the latter

connecting the helical elongated elements are each formed as a curvilinear segment having "a shape and orientation substantially different from shape and orientation of any of the elongated elements." '574 Patent at 6:44-49. Plaintiffs contend that this phrase means a "a shape and orientation substantially different than that of any portions of wire along the body." Defendants contend that the phrase cannot be construed and, thus, should be invalid for indefiniteness.

Patent law has always required a patentee to describe his invention under 35 U.S.C. § 112 in terms that are "precise enough to afford clear notice of what is claimed," and definite enough to clearly spell out the design and use of the patented product. *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S.Ct. 2120, 2129 (2014). In the past, the § 112 definiteness inquiry would uphold a patent "so long as the claim is 'amenable to construction,' and the claim, as construed, is not 'insolubly ambiguous.'" *Id.* at 2124 (citing *Biosig Instruments, Inc. v. Nautilus, Inc.*, 715 F.3d 891, 898-99 (Fed. Cir. 2013), *rev'd*, 134 S.Ct. 2120 (2014)). In *Nautilus*, the Supreme Court reconfigured this standard to provide a better fit for the

part, as quoted in the title of this Section. The parties address the term "curvilinear segment" separately. *See infra* Section III(A)(9). Thus, in this Section, I construe only the phrase beginning "a shape and orientation"

wording and intention of § 112. The new standard holds “that a patent is invalid for indefiniteness if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention.” *Nautilus*, 134 S.Ct. at 2124.

Although the new *Nautilus* standard may invalidate some particularly ambiguous patents that may have survived the previous test, the relevant inquiry remains the same: whether or not “a skilled artisan at the time of the patent application” would construe the patent’s claims with sufficient definiteness to understand the “scope of the invention with reasonable certainty.” *Id.*, 134 S.Ct. at 2129–30. The defendants urge a reading of *Nautilus* that heavily discounts the input of any extrinsic evidence (such as expert testimony), and must rely on what is contained within the four corners of the patent application and its prosecution history. However, “claim construction calls for ‘the necessarily sophisticated analysis of the whole document,’ and may turn on evaluations of expert testimony.” *Id.* (quoting *Markman*, 517 U.S. at 389). To understand whether a “skilled artisan” working in the relevant field would understand the scope of a given patent, expert testimony should not be considered extrinsic evidence with little value; to the contrary, it is essential to understand

what meaning such a person would take from the wording of the patent's claims and specifications.

The Defendants have argued that three phrases should be found indefinite under the new *Nautilus* standard: the phrase construed in this section, the phrase "radial force" in Section III(B)(6), and the phrase "diameters are selected to facilitate a placement of the tubular wall at a junction of the esophagus with the stomach", analyzed in Section III(B)(9). Each phrase requires renewed analysis under the new standard. But the new standard does not change the end result with regard to any of the phrases in question. I will take up each argument in turn in its relevant section.

As to the phrase at issue here, *first*, Defendants argue that the word "orientation" is ambiguous and cannot be construed. Defendants state that the word "orientation" is a relative term, citing its definition in *Webster's College Dictionary* 954 as "position in relation to true north, to points on the compass, or to a specific place or object." Defendants contend that, by contrast to the term's definition, the claim language "requires 'orientation' to be a measure of a specific characteristic (other than 'shape') of the curvilinear segment independent of the elongate elements rather than a relative comparison between the curvilinear segment and the elongated elements." The argument appears to be that because the '574

Patent does not designate the specific orientations of any of these elements, the meaning of "orientation" cannot be construed. I do not find it to be so ambiguous.

The claim requires the segment to have an orientation "substantially different" from that of any of the elongated elements. The claim does not state that the curvilinear or the elongated elements must be oriented in a specific way. It only requires that the orientation of the curvilinear segment must be substantially different from the orientations of the elongated elements. This is a relative definition and relative definitions are not now invalid under the relevant standard. In the wake of *Nautilus*, the Federal Circuit clarified that it does not hold that "terms of degree are inherently indefinite. Claim language employing terms of degree has long been found definite where it provided enough certainty to one of skill in the art when read in the context of the invention." *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1370 (Fed. Cir. 2014) (citation omitted). A reading of the phrase in question here would lead one skilled in the relevant field to understand the intended relative position of the elements in question. Defendants' characterization otherwise contorts the language beyond recognition.

Second, Defendants contend that the word "any" is ambiguous because "[t]he intrinsic evidence nowhere clarifies whether this

means that the curvilinear segment must merely be different than any one particular helical elongated element or, rather, different from *any* (i.e., *all*) helical elongated elements." This contention also seeks to introduce unnecessary confusion into the claim language. The *American Heritage Dictionary* 64 defines "any" as "[o]ne, some, every or all without specification." "Any" does not refer to a particular element. Defendants provide no rationale for any other meaning. If "any" is read to mean that the curvilinear segments must have a different shape and orientation than one elongated element, the claim would not make sense. However, if "any" is read to mean that the curvilinear segments must have a different shape and orientation than all of the elongated elements, the meaning is clear. The fact that "any" can somehow be rendered to suggest two alternative definitions, one coherent and one nonsensical, does not justify a declaration that the term is indefinite, as Defendants suggest. Rather, it logically leads to the conclusion that the definition leading to a coherent reading must be the correct one. It is therefore unambiguous that the phrase refers to a curvilinear segment with a shape and orientation substantially different from that of any (i.e., *all*) of the elongated elements.

Third, Defendants contend that because the intrinsic record does not teach how to measure the orientation of any of the

elements, the term cannot be construed. However, Defendants do not present expert testimony or any other evidence showing different ways to measure orientation or that choosing between different measurement methods would create a material difference in determining whether or not the orientations of the elongated elements differ from the curvilinear segments. In the absence of any evidence that it matters how the orientation is measured, I will not find the term ambiguous on these grounds.

Fourth, Defendants contend (in a footnote and without further analysis), that “[w]hether the claimed orientations are ‘substantially different’ is its own entirely subjective analysis that the intrinsic record fails to teach or explain.” If true, this could render the term could indefinite, but Defendants have presented no evidence that “a person of ordinary skill in the art cannot translate the definition into [a] meaningfully precise claim scope.” *Halliburton Energy Services, Inc., v. M-I LLC*, 514 F.3d 1244, 1251 (Fed. Cir. 2008).

Finally, Defendants argue broadly that a person of ordinary skill in the art at the relevant time would not have understood the meaning of the term “orientation.” Defendants do not provide any further explanation. The untenable suggestion appears to be that the term orientation is always ambiguous absent an express definition. They do not provide an expert affidavit or other evidence. Nor can they contend that the case

law requires the specification to define every term contained within the claims. Without further explanation as to the basis of this argument, I cannot find that the term "orientation" is either generally ambiguous or that it is ambiguous in the context of the '574 Patent.

Unlike Defendants, Plaintiffs contend that the phrase can be construed. They offer only a slight modification of the original as their proposed definition, interpreting "from shape and orientation of any of the elongated elements" to mean "than that of any portions of wire along the body." This interpretation seems unnecessary. The phrase "that of" refers to the "shape and orientation." Using a demonstrative pronoun does not clarify the meaning of the terms or resolve any dispute between the parties. Similarly, I have already construed the term "elongated elements" to mean "portions of wire forming the side surface." The plaintiffs have not shown that the term should be construed any differently in this claim.

I therefore reject Defendants' contention that the phrase "a shape and orientation substantially different from shape and orientation of any of the elongated elements" cannot be construed, and I construe it to mean what it says: "a shape and orientation substantially different from shape and orientation of any of the elongated elements" where "elongated elements" means "portions of wire forming the side surface."

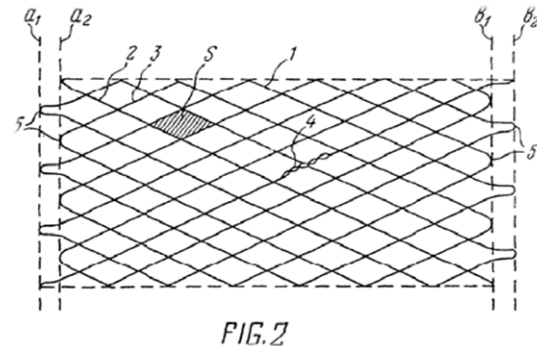
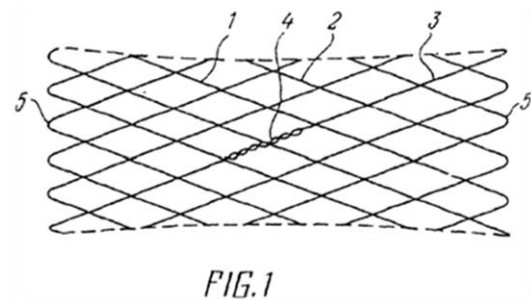
7. "free ends" and "said first and second ends"

Six of the seven Pulnev Patents include one or both of the phrases "free ends" and "said first and second ends."

Plaintiffs contend that neither phrase requires construction. Defendants contend that both terms should be construed to mean "the portion of the thread / elongate member that extends between that thread's / elongate member's last cross of an oppositely directed thread / elongate member and its tip."

Defendants base their contention on Figure 1, the first of the five diagrams included within the specification in each of the Pulnev Patents. Claims 6 and 16 of the '574 Patent refer to the "free ends (4)" of the threads being interlaced with another free end and/or with an elongated element. See '574 Patent at 7:5-9, 8:16-19. The number "4," in context, refers to a label on Figures 1 and 2 indicating an area of interlacing threads spanning three thread-intersection points:

Defendants overlook that the "free end" or "free ends" that are interlaced in Figures 1 and 2 extend further than from the last cross of an oppositely directed thread to the tip. In the figures, the "free end" or "free ends" extend from either the penultimate or the third-to-last cross of an oppositely directed thread to the tip, including the final cross at which the interlaced section ends. Defendants' construction contradicts the information conveyed in Figure 1 of the '574 Patent and is therefore unduly limited.



Defendants state that the common definition of "free," as stated in the *Webster's Third Dictionary* 905, is "not supported." They argue that the "loose" portion of the threads is the portion at the end of a thread that is not supported or constrained. They have not justified, however, why this meaning would limit "free ends" to a particular length.

Defendants contend that by rejecting their definition and insisting that the terms "free end(s)" and "said first and second end(s)" require no construction, "Plaintiffs do not provide any meaningful construction for the disputed term 'free

ends.'" However, Defendants do not go on to explain why the term "free" is ambiguous or needs further construction. The same is true for the phrase "said first and second ends": Defendants have not shown how the phrase might be ambiguous or in need of construction. Indeed, they acknowledge the applicability of the general meaning of the term "free" in this context, namely "unsupported" or "unconstrained" and offer no justification at all for limiting the lengths of these "ends" in order to construe the claims that include either phrase. For these reasons, I hold that neither the phrase "free ends" nor the phrase "said first and second ends" requires construction.

8. "mesh structure"

The '368 Patent and the '068 Patent both include claims that teach that the elongated elements form a "mesh structure." See '368 Patent at 6:39, 6:43, 7:28, 7:32, 8:26-42; '068 Patent at 6:41, 6:46, 7:40, 7:47, 8:34-52. Plaintiffs contend that the phrase should be construed as a "structure forming a net or network." Defendants contend that the phrase should be construed as "a pattern of openings made by an arrangement of interlaced helical threads." There are three functional differences between the two definitions: unlike Plaintiffs, Defendants have included the requirements that the mesh be made of (1) threads that are (2) interlaced and (3) helical.

Defendants purport to derive these three differences from the description of Figure 2 in the Pulnev Patents' specifications, which states:

The number of turns of the thread 1 and their pitch are preset proceeding from the required interlacing density, which is so selected that the area S of meshes established by the intersecting helical turns provides the required rigidity, whereas the meshes should be large enough not to cause hyperplasia . . . or earlier thrombosis complications.

See, e.g., '386 Patent at 5:34-41.

However, the description does not define "mesh" for the purposes of the rest of the patent. Instead, it describes the mesh *in that particular embodiment*. See, e.g., '386 Patent at 4:63-64 (explaining that the figures and descriptions are "illustrative embodiments."). A party may "narrow a claim term's ordinary meaning, but he cannot do so simply by pointing to the preferred embodiment or other structures or steps disclosed in the specification" *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002).

Defendants offer no reason to find that the characteristics of the mesh in Figure 2 characterize all mesh under the claims of the Pulnev Patents. Indeed, if "mesh" were construed to be a structure formed by interlacing helices, the statement that the mesh was "established by the intersecting helical turns" would be redundant.

The doctrine of claim differentiation dictates that it would be inappropriate to import the specification's limitations that the threads making up a mesh be (1) helical and (2) interlacing. Claim 21 of the '386 Patent teaches a "mesh structure" composed of elongate elements. See '386 Patent at 7:23-31. Claim 23 teaches "[t]he device of claim 21, wherein said mesh structure comprises at least one portion where said elongate elements cross to define an interlacing pattern." See *id.* at 7:37-39. Claim 33 teaches "[t]he device of claim 21, wherein the elongate elements are arranged along helical lines having opposite senses of helix." See *id.* at 8:8-10. Claim 23 would be redundant if all meshes were made up of interlacing patterns. The statement in Claim 33 that the elongate elements in the mesh "are arranged along helical lines" would be redundant if all meshes were made up of helical lines. "[T]he presence of a dependent claim that adds a particular limitation raises a presumption that the limitation in question is not found in the independent claim," *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 910 (Fed. Cir. 2004), and here Defendants raise no intrinsic evidence to rebut that presumption.

As for Defendants' proposed limitation that the mesh must be made of threads, this limitation adds nothing to any of the relevant claims. Each of the claims incorporating the phrase "mesh structure" or the word "mesh" also describes the mesh

structure as made of threads. See '386 Patent at Claims 1, 2, 21, 22, and 42; '068 Patent at Claims 1, 2, 22, 23, and 42. While accurate, the addition of such a limitation is unnecessary given the text of the claims.

Plaintiffs, by contrast, propose a construction based on the definition of mesh in the *American Heritage Dictionary* 870 as "an openwork fabric or structure; a net or network" However, Plaintiffs' proposal of "a structure forming a net or network" does nothing to clarify the claim term. In fact, the definition "a structure forming a net or network" is broader and more ambiguous than the term it seeks to construe. For these reasons, "mesh structure" is not in any need of further construction at this stage.

9. "merging sections," "bending points," "bend(s)," "connection elements," "curvilinear segment," and "circle arc segment"

One or more of the six terms "merging sections," "bending points," "bend(s)," "connecting elements," "curvilinear segment," and "circle arc segment" are contained within the claims of each of the Pulnev Patents. Plaintiffs suggest that "merging sections" means "sections of the portion of wire at the body ends"; "bending points" means "locations of bending"; "bend(s)" means "shape(s) resulting from having been bent"; "connecting elements" means "connecting (v.) portions of wire"; "curvilinear segment" should be construed to mean "curved

portion of wire"; and "circle arc segment" should be construed to mean "portion of wire having the shape of a part of a circle." Defendants suggest that all of these terms mean "a section that connects oppositely wound thread segments in a smooth, continuous, non-angular fashion, so as to have a circle arc, loop or U-shape."

Defendants present four arguments in support of their proposition that a single definition can encompass all of these disparate terms.

First, Defendants argue that "[t]he terms of this group all relate to the same structural portion of the stent." However, this does not imply that the terms all have the same meaning. Instead, "[t]here is an inference . . . that two different terms used in a patent have different meanings." *Comaper Corp. v. Antec, Inc.*, 596 F.3d 1343, 1348 (Fed. Cir. 2010).

While the inference is not always conclusive, *id.*, the language of the claims supports it in this case. For instance, in the '415 Patent, Claim 9 describes merging sections, see '415 Patent at 6:50-52, Claim 10 describes "[t]he device of claim 9, wherein each of said merging sections embody a bend," see *id.* at 6:54-53, and Claim 11 describes "[t]he device of claim 10, wherein each of said bends are shaped as a circle arc," see *id.* at 6:55-56. Claim 10 would be redundant if the term "merging sections" in Claim 9 implied a "bend," and Claim 11 would be

redundant if either the term "merging sections" in Claim 9 or the term "bend" in Claim 10 implied a circle arc.

Similarly, in several of the Pulnev Patents, independent claims teaching a "bending point" are referenced in two dependent claims which respectively add the sole limitations that "the bending points have a circle arc segment" and that "the bending points have a curvilinear segment." See '502 Patent at Claims 1, 13, and 14; '502 Patent at Claims 16, 25, and 26; '502 Patent at Claims 28, 29, and 30; '503 Patent at Claims 1, 13, and 14; '503 Patent at Claims 17, 26, and 27; '503 Patent at Claims 30, 31, and 32; '386 Patent at Claims 1, 16, and 17; '386 Patent at Claims 21, 25, and 26; '068 Patent at Claims 1, 16, and 17; and '068 Patent at Claims 22, 26, and 27. Under the doctrine of claim differentiation, there is a "presumption that each claim in a patent has a different scope," *Curtiss-Wright Flow Control Corp. v. Velan, Inc.*, 438 F.3d 1374, 1380 (Fed. Cir. 2006), and therefore that each of these terms has a distinct meaning. Defendants have not rebutted the presumption as it applies to these terms in the Pulnev Patents.

Second, Defendants argue that the Pulnev Patent specifications describe the shape of the bend as having an increased radius of curvature, supporting a definition of the term "bend" as requiring a particular type of shape. However, the section in the specifications to which Defendants cite

states only that "[i]t is expedient that on the sections of merging, the turns of one helical line merge into those of the helical line with the opposite sense of helix. In this case, the radius of curvature of the merging section is increased, and such sections become more resilient." See, e.g., '574 Patent at 4:1-5 (emphasis added). The specifications refer to a preferred, or expedient, embodiment, and do not define the term "bend" for the purposes of all possible embodiments.

Third, Defendants argue that the disclosed shapes must be circle arc, loop, or U-shapes, not angular V-shapes because the specifications state that the V-shape is undesirable. In support of this proposition they cite three statements in the specifications. The specifications state that "[a] bent or curvilinear segment connecting two helical elements made from the same thread can have various shapes, e.g. of a circular arc, a loop or an U-shaped." See, e.g., '574 Patent at 4:6-8. This statement does not limit the shape of the bent or curvilinear segment to only these three options. It provides examples but does not state that they constitute an exclusive list of possibilities. However, the common element in all of the examples is that the curvilinear segment is, in fact, curved rather than angular. The specifications state that in one particular case, "the radius of curvature of the merging section is increased" See, e.g., *id.* at 4:3-4. This

statement, discussed above, addresses only one preferred embodiment and not all possible embodiments. The specification that "instead of joining the threads at both ends of the stent by welding, soldering or other similar means, these ends are connected by curvilinear segments made of the same piece of thread." See, e.g., *id.* at 3:8-11. Therefore, the curvilinear segment may take many forms not limited to the examples provided, but must exclude angular V-shapes, which do not fall within the meaning of curvilinear and are fundamentally different than all of the potential examples provided.

Fourth and finally, Defendants' prosecution history argument supports only the exclusion of V-shapes, and does not justify the other suggested limitations. During the prosecution of the '574 Patent, the applicants distinguished the Palmaz Patent by noting:

It is clearly seen in Figures 1A and 1B of Palmaz that these elongated members meet each other at their ends precisely at the same sharp angle and in the same manner as in their intersections points. Because the elongated members possess substantial elasticity, *it is evidently impossible to bend a single elastic wire into such a sharp angle.* It follows, that each elongated element disclosed in Palmaz is made from a separate wire, and, instead of merging into each other (as suggested in claim 12), the wires are simply secured to one another at their ends in precisely the same manner as they are at their intersection points, that is either by welding, soldering, or gluing.

In contrast to Palmaz, at least some of the elongated helical members of the present invention merge into each other, that is at least some selected pairs of these

elements are made from a single piece of wire, or a thread, and that elements of each selected pair are joined together by a connecting portion of the same thread. The connecting portion is formed as a curvilinear segment

(internal citations and references omitted) (emphasis added).

This does not necessarily require that the turning radius be "smooth" or "continuous" as Defendants suggest in their proposed construction. This particular argument only serves to reject angles so sharp that they must have been composed by securing two separate wires at their end points instead of by incorporating a connecting segment.

In short, Defendants' proposed definition incorporates a variety of elements that are not required by the evidence and inappropriately conflate the definitions of a list of distinct terms with distinct meanings. Defendants are correct, however, that the claim and specification languages forecloses the possibility of V-shaped or purely angular "curvilinear segments," as such a definition would be self-contradictory. As discussed further below, I therefore do not adopt Defendants' construction except insofar as it requires the "curvilinear segments" to be curved rather than angular.

Plaintiffs, by contrast, have provided six separate definitions, one for each of the six terms.

First, Plaintiffs contend that "merging sections" should be construed as "sections of the portions of wire at the body

ends." In support of this construction they cite the section of each of the Pulnev Patents describing Figure 3, which refers to "merging sections 5 at the stent ends." See, e.g., '574 Patent at 5:35-36. However, this description does not imply that a merging section is, by definition, at the end of a stent. Instead, it indicates that a "merging section" means something *distinct* from "sections of the portions of wire at the body ends" in order to avoid redundancy. Moreover, Plaintiffs do not explain why their definition excludes the limitation that these sections are "merging," which is inherent in the claim language. In short, neither Defendants nor Plaintiffs have shown that the term "merging sections" is ambiguous or requires limitation. I therefore decline to construe it.

Second, Plaintiffs contend that "bending points" should be construed to mean "locations of bending" and that "bend(s)" refers to "shape(s) resulting from having been bent." The specifications indicate that the "bending point" refers to the location of the bend. See '574 Patent at 4:55-58 (describing the "bending points" as "situated transverse planes relative to the longitudinal axis"). Accordingly, I adopt Plaintiffs' proposed definition and construe "bending points" to mean "locations of bending."

Third, the specifications indicate that the term "bend" is indeed used as a noun, to indicate a bent shape. See *id.* at

3:5-7 (describing the sections where the helical lines merge as "appearing as a bend of a single thread segment"); *id.* at 3:14-23 (describing the stent ends as "formed by all the aforesaid sections of the thread bend" and stating that "due to their elastic properties" the "section of the thread bend tend to restore their original shape after having undergone deformation"); *id.* at 4:6-15 (stating that a "bend or curvilinear segment . . . can have various shapes, e.g. of a circular arc, a loop or an U-shaped"); *id.* at 5:5-16 (describing the sections merging the turns of two threads to as "appear[ing] as a bend of the single segment of the thread"). Accordingly, I adopt Plaintiffs' proposed definition and construe "bend(s)" to mean "shape(s) resulting from having been bent."

Fourth, Claim 1 of the '574 Patent teaches that "each portion of the thread for connecting elements made of the same thread is formed as a curvilinear segment" '574 Patent at 6:44-45 (emphasis added). Defendants have proposed that "for connecting" should be construed as "that connects," while Plaintiffs have proposed that it should be construed as "connecting (v.)." I am not aware of, nor have the parties raised, any difference in the meaning or import of these two interpretations. Defendants' interpretation is clearer, as it conveys the same message without resorting to a grammatical label. In keeping with the parties' agreement that "element"

should be interpreted in the same way as "thread," I hold that "elements" means "portions of wire." Therefore, I construe "for connecting elements" to mean "that connects portions of wire."

Fifth, Plaintiffs contend that "curvilinear segment" should be construed to mean "curved portion of wire." Plaintiffs contend that this definition should be adopted because the Pulnev Patent specifications refer to "curvilinear segments made of the same piece of thread." See, e.g., '574 Patent at 3:10-11. However, this statement does not imply that every segment must be made of thread or wire or that the word "segment" as used in the patent automatically implies "portion of wire."

Claim 2 of the '323 Patent demonstrates that including such a requirement within the definition of "segment" would read redundancies into the claims. Claim 1 describes a body formed by interlaced threads, and Claim 2 teaches "[a] stent as set forth in claim 1, wherein the turns of all helical lines are made of a single segment of the thread." '323 Patent at 6:42-43. If Plaintiffs' definition of "segment" were adopted, Claim 2 would teach that all of the turns "are made of a single portion of wire of the portion of wire." Because I already construed "wire" to be a part of the definition of "thread," it would be redundant to include it within the definition of "segment" as well. Plaintiffs have not shown that "segment" should be construed to require that the segment be made of wire.

Accordingly, neither Plaintiffs nor the Defendants have shown that the term "segment" requires further definition.

Plaintiffs' construction of the term "curvilinear" as "curved," is consistent with Defendants' proposed construction that the curvilinear segment connects other threads in a "smooth, continuous, non-angular fashion." Although I have rejected the particular limitations that the Defendants have placed on the term, both parties appear to agree that "curvilinear," at a minimum, means "curved." This accords with the general definition of the term curvilinear. See *The New Shorter Oxford English Dictionary* 576 (1993) ("*New Oxford Dictionary*") (defining curvilinear as "[c]onsisting of or contained by a curved line or lines; of the form of a curved line"). Accordingly, I construe "curvilinear segment" to mean "curved segment."

Sixth and finally, Plaintiffs construe "circle arc segment" to mean "portion of wire having the shape of part of a circle." In keeping with my construction of "segment" in the phrase "curvilinear segment," above, I will not construe the term "segment" to mean "portion of wire." Plaintiffs' construction of "circle arc," however, is in keeping with the ordinary definition of "arc," see *New Oxford Dictionary* 107 (defining "arc" as "[p]art of the circumference of a circle or other curve"), and Defendants do not dispute this meaning.

Accordingly, I construe "circle arc segment" to mean "segment having the shape of a part of a circle."

B. The Hankh Patents

1. "truncated conical segment" and "truncated conical portion"

The claims of the '015 Patent incorporate the phrase "truncated conical segment." The claims of the '810 Patent incorporate both the phrase "truncated conical segment" and the phrase "truncated conical portion." Plaintiffs contend that both phrases should be construed to mean "truncated segment having an incline or taper (as differentiated from an abrupt, stepped transition)." Defendants contend that both phrases should be construed to mean "[a] segment having a gradual, non-abrupt incline or taper consistent with a solid formed by rotating a right triangle about one of its sides, with the apex cut off by a plane parallel to the base of the segment, where the segment extends a non-trivial length that spans at least two axially aligned mesh openings."

The dispute over Defendants' definition falls into three parts: The first part: "gradual, non-abrupt incline or taper," the second part beginning "consistent with a solid formed by rotating a right triangle about one of its sides . . ." and the third, and final part: "extends a non-trivial length that spans

at least two axially aligned mesh openings." I address each part in turn.

First, Plaintiffs do not object to the first part, and I agree that "a gradual, non-abrupt incline or taper" is an appropriate expression of limitation grounded in the claim language and prosecution history. In distinguishing the prior art, the applicants clearly limited their invention to stents in which the relevant segment featured a non-abrupt taper or incline.

Second, the disagreement regarding the second part of Defendants' definition centers on the proper interpretation of the prosecution history. During the prosecution of the '810 Patent, the applicants stated:

In the present specification, the feature of the truncated segment is shown in several embodiments [in the diagrams]. In these cases, the 'truncated conical segment' has the characteristic incline or taper. This is consistent with the standard definition of a cone, as the solid formed by rotating a right triangle about one of its sides. Further, the proximal and distal edges are consistent with the standard definition of 'truncated,' in that an apex of a cone is replaced by plane section, particularly one parallel to the base of the cone.

The applicants went on to distinguish prior art because "there [was] no disclosure of a taper or incline characteristic of a truncated cone."

Defendants are correct that the definitions recited in the prosecution history for the term "cone" ("the solid formed by

rotating a right triangle about one of its sides") and the term "truncated" ("an apex of a cone is replaced by plane section, particularly one parallel to the base of the cone") should inform interpretation of the claim terms. "[T]he prosecution history can often inform the meaning of the claim language by demonstrating how the inventor understood the invention," *Phillips*, 415 F.3d at 1317, and "[i]t is well settled that a patentee may define a claim term either in the written description of the patent or, as in the present case, in the prosecution history." *Honeywell Inc. v. Victor Co. of Japan, Ltd.*, 298 F.3d 1317, 1324 (Fed. Cir. 2002).

Plaintiffs contend that any disclaimer of claim scope in the prosecution history must be clear and unmistakable. Plaintiffs appear to misunderstand the argument - the statements regarding the "standard definition[s]" of the terms provided by the applicants were not disclaimers. They are definitions, and clearly labeled so. "Although the inventor's definition does not have a narrowing effect, it is nonetheless relevant in indicating the meaning that the inventor ascribed to the term." *Id.* at 1324. Plaintiffs provide no reason to believe that the meaning the inventor ascribed to the term was incorrect or non-standard.

Indeed, Plaintiffs' proposed construction lacks any definition of the term "conical," and, in fact fails to mention

the term at all. While Plaintiffs have disclaimed stents with abrupt transitions that do not feature an incline or taper, as is appropriate in light of the prosecution history, their suggested construction insupportably removes the term "conical" itself. The requirement that the segment have a non-abrupt incline or taper cannot replace the claim term "conical." As Defendants point out, an incline or taper could characterize shapes that are not "conical," such as pyramids. Plaintiffs, for their part, provide no explanation for their removal of the term "conical" from the claims, and I therefore reject their proposed construction.

In light of the claims, which clearly call for a segment that is both "conical" and "truncated," and in light of the prosecution history which explicitly defines these terms, I adopt the second part of Defendants' definition: "consistent with a solid formed by rotating a right triangle about one of its sides, with the apex cut off by a plane parallel to the base of the segment."

Third, and finally, I do not adopt Defendants' proposed limitation that the segment "extends a non-trivial length that spans at least two axially aligned mesh openings," because the claims include no such limitation. Defendants offer three arguments in support of this portion of their proposed definition. Each is unconvincing:

First, Defendants argue that each of the figures within the specification includes a conical section that spans at least two axially aligned mesh openings. Plaintiffs dispute this characterization of the figures, but I need not resolve the dispute. It is sufficient to note that the specification in each of the Hankh Patents states that the figures "show, diagrammatically and *by way of example only*, preferred but still illustrative embodiments of the invention." See, e.g., '810 Patent at 5:40-42 (emphasis added). The figures represent preferred embodiments only and their inclusion within the specification does not imply that every embodiment must echo these characteristics. See *Johnson Worldwide Associates, Inc.*, 175 F.3d at 992 ("[M]ere inferences drawn from the description of an embodiment of the invention cannot serve to limit claim terms").

Second, Defendants argue that (1) in the parent application, the applicants claimed that the intermediate segment had to be longer than the proximal segment, and (2) the proximal segment is depicted in the Hankh Patents to be two or more axially-aligned segments in length. Like Defendants' first argument, this assumes that the figures included in the specification are representative of all embodiments and limiting on the claims. As discussed above, this is incorrect.

Third, Defendants state that the specifications of the Hankh Patents assert that the function of the "truncated conical segment" is to "raise flexibility and/or radial force," and to "limit[] any flattening deformation tendency," see, e.g., '810 Patent at 2:56-62, and that during the prosecution of the '810 Patent the applicants stated that "there is no teaching [in the prior art] of an additional segment to provide a transition in radial force between the tubular body and the locking ring." Defendants contend that in order to serve these purposes, the segment must be a non-trivial length. They then extrapolate based on the figures in the specification that this length must be at least two axially aligned mesh openings, because they believe that no shorter length appears in the figures. This argument fails for two reasons: (1) The descriptions of purpose included within the Hankh Patents and during the prosecution of the '810 Patent are not specifically directed at the definition of a "truncated conical segment" but instead describe the purposes of the "intermediate segment" more generally. It is only after the phrases quoted by Defendants that the specifications go on to address "[w]here the third intermediate segment is a truncated cone" See, e.g., '810 Patent at 3:12-13. Similarly, the claim being described in the prosecution history cited by Defendants does not include a requirement of a "truncated conical segment" and the discussion

quoted does not refer to such a segment. (2) More fundamentally, this argument violates a primary tenet of claim construction: Defendants are reading limitations into the claims, specifications and prosecution history that are not there. While the specifications and prosecution history recite the general reasons for the claimed structure, they do not set any lower limit on the length of the intermediate segment. They do not state that a "non-trivial" length is necessary or indicate what a "non-trivial" length might be.

I will not incorporate the third part of Defendants' proposed definition requiring a minimum length. Therefore, the proper construction of "truncated conical segment" is "[a] segment having a gradual, non-abrupt incline or taper consistent with a solid formed by rotating a right triangle about one of its sides, with the apex cut off by a plane parallel to the base of the segment."

2. "intermediate segment" and "second tubular segment"

The claims of the '810 Patent refer to an "intermediate segment," and the claims of the '015 Patent refer to a "second tubular segment." Plaintiffs contend that neither of these terms requires construction. Defendants contend that both terms should be construed to mean "a segment having one or more gradual, non-abrupt inclines or tapers consistent with a solid formed by rotating a right triangle about one of its sides, with

the apex of each incline or taper cut off by a plane parallel to the base of the segment, wherein the segment extends a non-trivial length that spans at least two axially aligned mesh openings."

In support of their interpretation, Defendants first turn to the written description. They cite the Hankh specifications' description of Figure 1, which states:

Between segments 7 and 11 is formed an intermediate segment 15 having a proximal end connected to the distal end of proximal segment 7 and a distal end 17 connected to the proximal end 12 of distal segment 11. As shown in FIG 1., the intermediate segment 15 forms a truncated cone of which the base is forming the proximal end 16 of the intermediate segment and of which the top is forming the distal end 17 of the intermediate segment. Other shapes are available to form the intermediate segment 15.

See, e.g., '810 Patent at 6:15-23. Defendants cite this section of the specifications in support of the proposition that an intermediate segment *must* form a truncated cone, but the Hankh specifications only indicate that the segment *may* form a truncated cone, as it does in the embodiment in Figure 1. In other embodiments, "[o]ther shapes are available to form the intermediate segment"

Defendants contend that the "[o]ther shapes" must all include at least one truncated cone because the "[o]ther shapes" that are described in the specification each include at least one truncated cone. Defendants cite the description included

within each Hankh specification of Figures 5 and 6, *see, e.g.*, '810 Patent at 7:50-57, 7:64-8:3, as well as the diagrams labeled Figures 1, 5, 6, and 7, which illustrate various stent embodiments. They also cite the description of Figures 3A and 4A, which depict mandrels which may be used to manufacture the stent, and the Figures themselves, which illustrate embodiments of possible methods of manufacturing the stent. Defendants argue that each of these stent embodiments includes a truncated conical segment, and that each of the mandrel embodiments would create a stent including a truncated conical segment.

This argument is unconvincing. The descriptions and diagrams are mere illustrative embodiments, and nothing in the claim language *requires* the conical shape Defendants insist upon. See '810 Patent at 5:40-42 (describing the Figures as "embodiments" and "by way of example only."). Furthermore, the descriptions and diagrams do not limit the claim terms. See *Johnson Worldwide Associates, Inc.*, 175 F.3d at 992 (illustrative embodiments "cannot serve to limit claim terms.")⁵

⁵ *Honeywell International, Inc. v. ITT Industries, Inc.*, 452 F.3d 1312 (Fed. Cir. 2006) does not contradict this general premise. In *Honeywell*, specific language in the written description indicated that a characteristic was not merely a part of a preferred embodiment but instead a mandatory part of the invention. See *Honeywell*, 452 F.3d at 1318-19. By contrast, here the language cited by Defendants stating that the intermediate segment includes a truncated conical segment either (1) describes a particular embodiment but not every embodiment of the invention; (2) is permissive but not mandatory (*e.g.*,

Defendants also point to the language in the Abstracts of the Hankh Patents that describes the intermediate segment as "form[ing] a truncated cone of which the base is forming the proximal end of the intermediate segment and of which the top is forming the distal end of the intermediate segment." Abstracts, Hankh Patents. "While a statement in the Abstract may operate as a clear expression of manifest exclusion, for several reasons, this statement does not." *Innova/Pure Water, Inc.*, 381 F.3d at 1121. "To begin, this statement is in the Abstract of the patent. This section of a patent speaks generally to the invention and, much like the syllabus of an opinion, sets forth general information about the document's content, which is described in more detail in the remainder of the document." *Id.*

Here, the language in the Abstract does not set forth general information that describes all possible embodiments, but instead provides a description of a particular embodiment. While not identified as such, this is evident from a comparison of the Abstracts with the rest of the Hankh Patents. The quoted language limits the intermediate segment to that which forms a single "truncated cone" from the beginning to the end of the

"the third intermediate segment *may be* a truncated cone" '810 Patent at 4:45-46 (emphasis added)); or (3) is located in Abstracts that contradict the written descriptions and the claims.

segment. This is inconsistent with both Defendants' construction (allowing any shape that merely *includes* a truncated cone) and the plain language of the written descriptions (allowing "other shapes" beyond a truncated cone, see, e.g., '810 Patent at 6:22-23). Moreover, the language in the Abstracts is not fully consistent with the language in the claims. Claim 25 of the '810 Patent teaches that "the intermediate segment incorporates at least one truncated conical portion disposed about the longitudinal axis," '810 Patent at 10:32-35, which includes intermediate segments incorporating more than one truncated conical portion. In light of the dissonance between the Abstracts and the remainder of the Hankh Patents, I will not import limitations into the claims from the Abstracts.

Defendants attempt to bolster their argument by pointing to the portion of the specifications stating that the intermediate segment provides a "varying steep [braid] angle" that "raises flexibility and/or radial force" and "strongly limits any flattening deformation tendency." See, e.g., '810 Patent at 2:56-63. Defendants contend that the only structure that Hankh discloses that is allegedly capable of providing these features is an intermediate segment with one or more truncated cones. "Perhaps the most straightforward answer to [Defendants'] argument is that the law does not require the court, where an

applicant describes only a single embodiment, to construe the claims as limited to that one embodiment.” *Innova/Pure Water, Inc. v. Safari Water Filtration Systems, Inc.*, 381 F.3d 1111, 1121-22 (Fed. Cir. 2004). This is especially true where, as here, the specifications explicitly notes that “[o]ther shapes are available to form the intermediate segment.” See, e.g., ‘810 Patent at 6:22-23 (internal references omitted).⁶

Finally, Defendants contend that “second tubular segment” should be construed identically as “intermediate segment” because “in the context of the claim it is clear that the first tubular segment refers to the ‘proximal segment,’ and the second tubular segment refers to the ‘intermediate segment.’” I disagree. Claim 1 of the ‘015 Patent describes a first and a second tubular segment. It does not require any third segment. See ‘015 Patent at 8:22-35. By contrast, dependant Claim 4 includes a “third tubular segment.” See ‘015 Patent at 8:43-46. In the context of a claim such as Claim 1, which might include

⁶ In the alternative, Defendants contend that these statements in the specifications require the “intermediate segment” to be non-abrupt and extend a non-trivial length independently of any requirement that they include “truncated conical segments,” because only with these characteristics can the intermediate segment achieve its stated purposes. I reject these arguments at this point for the same reasons that I reject them above. See *supra* Section III(B)(1).

only two segments, it makes little sense to construe "second tubular segment" to mean "intermediate segment."

Nor will I adopt the definition that Defendants propose for "intermediate segment" as the definition for "second tubular segment." The proposed construction fails for the reasons listed above regarding the "intermediate segment." Defendants point to nothing in the Hankh specifications requiring that the "second tubular segment" incorporate one or more truncated conical segments.

In light of my rejection of Defendants' proposed limitations, I do not find that construction of "intermediate segment" or "second tubular segment" is necessary. As Plaintiffs contend, there is no ambiguity in these terms requiring resolution.

3. "distal segment" and "third tubular segment"

The claims of the '810 Patent refer to a "distal segment," and the claims of the '015 Patent refer to a "third tubular segment." Defendants propose construing both terms to mean "a segment at the distal end of the stent." Plaintiffs contend that neither term needs construction. However, Plaintiffs do provide some clarification in their briefing, stating that they believe the term "distal" in "distal segment" to mean only that the segment is "distal" to the intermediate segment.

Defendants state that the Hankh Patents consistently locate the "distal segment" at the distal end of the stent, opposite the proximal segment at the proximal end of the stent. They note that Figures 1, 5, and 6 each label the segment at the distal end of the stent as the "distal segment." They similarly note that in Figures 3A, 3C, 4A, and 4D, the distal segment is the segment located at the distal end of the mandrel, opposite the proximal segment at the proximal end of the mandrel. They argue that every distal segment described in the Hankh Patents is on the distal end and that therefore "distal segment" must mean "a segment at the distal end of the stent."

This argument, based on illustrative embodiments instead of on language indicating that every distal segment must be at the distal end of the stent, is unconvincing. "Although the specification may aid the court in interpreting the meaning of disputed claim language, particular embodiments and examples appearing in the specification will not generally be read into the claims." *Comark Communications, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed. Cir. 1998) (quoting *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988)). Moreover, the distal segment in each of these Figures is also the segment distal to the intermediate segment. The Figures are thus consistent with the definitions proposed by both parties.

Defendants' argument based on the prosecution history is no more convincing. Defendants state that the applicants distinguished U.S. Patent No. 5,575,818 ("Pinchuk Patent") during the '810 prosecution on the basis that the Pinchuk Patent fails "to disclose a stent with cylindrical proximal and distal segments, in which the distal segment diameter is smaller than the proximal segment diameter." They contend that by arguing that the distal segment diameter in the Pinchuk Patent was not smaller than the proximal segment diameter, the applicants made clear that the distal segment refers to the segment at the end of the stent. However, this again fails to distinguish between the definitions proposed by the parties. If "distal segment" means a segment that is distal to the intermediate segment, as Plaintiffs propose, then the same segment within the three-segment Pinchuk apparatus would be identified. Only one segment is distal of the intermediate segment, and it is also at the distal end of the apparatus.

Plaintiffs' arguments are no more convincing. Plaintiffs contend that the claims themselves define the "distal segment," such as the definition in Claim 24 of the '810 Patent that a distal segment is a segment "having a distal segment diameter less than the proximal segment diameter." The description in Claim 24, however, is a limitation of and not a definition for "distal segment." Claim 24 describes a stent including "a

distal segment having a distal segment diameter less than the proximal segment diameter." '810 Patent at 10:16-17. While it limits the types of distal segments that would infringe on the claim to those with diameters of a particular relative size, it does not define what "distal segment" means.

Next, Plaintiffs argue that "distal segment" cannot mean the segment at the distal end of the stent, because the Hankh specifications disclose that the "distal end of the distal segment may be flared up," see, e.g., '810 Patent at 8:11-12, and therefore the specification contemplates a possible additional flared section at the end of the stent, distal to the distal section. However, the specification describes the flared end as a *part* of the distal segment. The end of the distal segment itself flares up, not that of a new segment. Thus, the specification does not contemplate that the flared end constitutes a separate segment. It is true that the balance of the claim and specification language divides the segments based on diameter (assigning dividing lines to the points where the diameter begins to change). Therefore, this specification - describing a single "segment" as having a portion with consistent diameter *and* a flared portion with changing diameter - appears anomalous. However anomalous it may be, the specification does not appear to contemplate a new segment distal to the distal segment.

Finally, Plaintiffs argue that because the specifications do not expressly limit the stents to those with three segments, there is no reason to believe that there may not be additional segments that are distal to the distal segment. Plaintiffs cite *Gillette Co. v. Energizer Holdings, Inc.*, 405 F.3d 1367 (Fed. Cir. 2005) in support of their contention that the lack of a constraint on the number of segments means that proximal, intermediate, and distal segment may be supplemented by additional segments distal to the distal segment. *Gillette Co.* is inapposite. In *Gillette Co.*, the question was whether additional blades would be permitted where the patent described "a group of first, second, and third blades." *Gillette Co.*, 405 F.3d at 1371. Here, the question is not whether additional segments are possible but instead whether the "distal segment" must be the segment at the distal end of the stent.

There is a reason the parties struggle to construe this term: its definition poses a difficult question. Although the claims and the specification are not entirely clear, I find that "distal segment" should be construed to mean "a segment at the distal end of the stent." This finding is supported by the usage of the term in the claims of the '810 Patent and in both of the Hankh specifications.

Claims 5 and 18 of the '810 Patent describe "a distal segment disposed about the longitudinal axis distally of the

truncated conical segment." '810 Patent at 8:48-50, 9:32-33.

If "distal segment" is construed to mean a segment distal to the intermediate segment, the phrasing is redundant. If "distal segment" is construed to mean "a segment at the distal end of the stent," the phrase can be construed to mean that the segment is both at the distal end of the stent and located immediately distal to the truncated conical segment.

Further, dependent Claim 18 of the '810 Patent teaches that the covering is extended along at least a *portion* of the distal segment, see '810 Patent at 9:34-36, in contrast to Claim 15, on which it is dependent, which teaches that the truncated conical segment may be covered, see '810 Patent at 9:21-23, without describing a partial cover. The specifications similarly note that "[a] distal portion of the second distal segment may not be covered by the covering layer." See, e.g., '810 Patent at 4:58-60. The specifications explain that "a distal portion of the . . . distal segment may be uncovered by the covering layer to assure when required a better gripping of the stent to the body cavity in that area, because of the stronger interpenetration between braiding and vessel wall." See, e.g., '810 Patent at 3:33-37. Thus, the claims allow a partial covering of the distal segment to promote better adhesion to the body cavity. Adherence to the body cavity is only necessary for the segments at the ends of the stent.

The '810 Patent also teaches an embodiment in which "the distal segment is cylindrical and has a distal segment diameter substantially equal to the distal end diameter." '810 Patent at 8:51-52. The Hankh specifications explain that "[w]here the . . . proximal and . . . distal segments are cylindrical, the . . . proximal segment may firmly anchor the vessel . . . whereas the . . . distal segment may smoothly bear against the vessel wall, even in strongly narrowed areas." See, e.g., '810 Patent at 3:5-11. Thus, the purpose of the cylindrical distal segment is to allow the segment to "bear against the vessel wall," a purpose that only a segment at an end of the stent may serve.

The Hankh specifications also teach that "[t]he distal end of the . . . distal segment may be flared up." See, e.g., '810 Patent at 4:64-65. The specifications explain that this "provide[s] a further safety anchor of the stent in the body passageway" See, e.g., '810 Patent at 3:51-52. Segments located in the intermediate portion of the stent do not need a "safety anchor." The distal segment only benefits from such an anchor because it is at the end of the stent and needs to adhere to the body passageway.

All of these uses of the term "distal segment" in the claims of the '810 Patent and in the Hankh specifications lead

to my finding that the term should be construed to mean "a segment at the distal end of the stent."

By contrast, I do not find that "third tubular segment" as used in the '015 Patent means "a segment at the distal end of the stent." While the third tubular segment may be only partially covered, see '015 Patent at 9:42-46, nothing else indicates that the "third tubular segment" is the "distal" segment. The applicants chose to use the term "third tubular segment" instead of "distal segment," which they used elsewhere in the patent. See '015 Patent at 10:52-55. Because the applicants did not choose to label the segment as "distal," neither will I. I do not find that the term "third tubular segment" requires construction.

4. "the steep angle varies along the truncated conical segment in the longitudinal direction," "the steep angle increases along the truncated conical portion in the proximal direction," "the steep angle varies along the second tubular segment," and "the steep angle increases in the proximal direction along the second tubular segment"

The Hankh Patents teach strands making up a tubular wall that form a steep angle. Claim 12 of the '810 Patent teaches that "the steep angle varies along the truncated conical section in the longitudinal direction." '810 Patent at 9:11-14. Claim 29 of the '810 Patent teaches that "the steep angle increases along the truncated conical portion in the proximal direction." *Id.* at 10:49-51. Claim 12 of the '015 Patent teaches that "the

steep angle varies along the second tubular segment.” ‘015 Patent at 9:14-15. Claim 13 of the ‘015 Patent is dependent on Claim 12 and teaches that “the steep angle increases in the proximal direction along said second tubular segment.” *Id.* at 9:17-18. Plaintiffs contend that these phrases require no construction. Defendants contend that all of the phrases mean “the strands cross within the truncated conical segment / portion to form at least three angles that are oriented in the same axial direction and bisected by the same line, and the angles change/become greater from one to the next.”

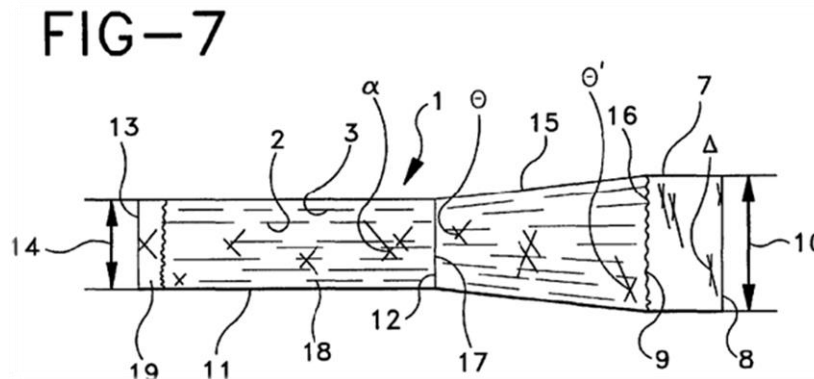
It is unclear from the text of the claim what “steep angle” measures. While Plaintiffs contend that claim construction need not address this question, I must determine what “steep angle” means in order “to give meaning to the limitations actually contained in the claims.” *Am. Piledriving Equipment, Inc. V. Geoquip, Inc.*, 637 F.3d 1324, 1331 (Fed. Cir. 2011). Without a definition for the term “steep angle,” one designing in this area might not know whether a product potentially infringes the Hankh Patents.

Defendants contend that the “steep angle” is the angle formed by crossing elements that are oriented in the same axial direction and bisected by the same line as the other angle(s) being measured. This contention is supported by the prosecution history. During the patent prosecution, the applicants added of

Figure 7 to the specification, in which the "varying steep angle" was identified:

The applicants stated:

The symbols α , θ , θ' , and Δ have been added to point out, with particularity, the varying steep angle over the longitudinal axis of the tubular wall. As shown . . . the angle α of the crosshatching in the distal way-making segment is constant over its length; the angle θ of the cross-hatching in the intermediate segment increases from θ to θ' over its length; and the angle Δ if the proximal anchor segment is constant over its length.



The description of the angles as formed by "the cross-hatching" supports the Defendants' contentions that the steep angles are formed by the crossing of two strands.

Moreover, the logic of the claim supports Defendants' contention that the angles measured must be oriented in the same axial direction. If the angle of the crosshatching is constant and does not vary or increase, there could still be variation if one were to compare an angle that opens towards the distal end at one point along the longitudinal axis with an angle that

opens perpendicularly to the ends at another point along the longitudinal axis. Plaintiffs do not explain how a comparison may be made between two angles without choosing which angles may be compared. Nor do they suggest any other mechanism for determining which angles should be compared.

Defendants' limitation that the angles must be "bisected by the same line," however, is unsupported. Defendants argue that this construction makes it clear that "strand crossings that are not axially aligned do not reflect angles varying 'in the longitudinal direction.'" However, even the axially aligned angles actually depicted in Figure 7 are *not* bisected by the same line. Moreover, the concept that the angles must be "axially aligned" is already a component of Defendants' definition, which describes "angles that are oriented in the same axial direction." The phrase "bisected by the same line" is therefore redundant, without basis in the claim language, and inconsistent with the specification. I will not adopt that component of Defendants' proposed definition.

Finally, Defendants contend that at least three angles must be compared. In support of the proposition that the phrases "varies along the truncated conical section / second tubular segment" and "increases along the truncated conical portion / second tubular segment" imply a trend in the angle instead of a singular or abrupt change. Defendants cite *Webster's Third*

Dictionary 2535, which defines "vary," *inter alia*, to mean "to bring about differences in," "to insure variety in," and "to exhibit differing qualities or attributes in alternation or succession with something else." None of these definitions uses the term "vary" in the manner in which it is used in the claims. The first two refer to a force causing variation in something else (as opposed to something exhibiting variation) and the last refers to the phrase "varies *with*." More fundamentally, none of these definitions states that at least three different measurements or characteristics must be exhibited in order to achieve variance.

Defendants also cite *Athletic Alternatives, Inc. v. Prince Manufacturing, Inc.*, 73 F.3d 1573 (Fed. Cir. 1996) in support of the proposition that variance requires at least three differing values of comparison. However, in *Athletic Alternatives*, the Federal Circuit first examined the claims, the specification, and the prosecution history in order to determine the meaning of this ambiguous term. Only when it found no evidence in favor of one interpretation (requiring at least three differing values) or the other (requiring some change without designating how many changes), did the Federal Circuit conclude that "there [was] an equal choice between a broader and a narrower meaning of a claim," and that, because the narrower claim was enabled, they would "consider the notice function of the claim to be best

served by adopting the narrower meaning.” *Athletic Alternatives, Inc.*, 73 F.3d at 1582.

Here, by contrast, the specification and prosecution history indicate that three measurements are not necessary to determine whether an angle increases or varies. When the applicants added Figure 7, they explained that the Figure “show[ed]” that “the intermediate segment increases . . . over its length.” Figure 7, however, exhibits only two angle measurements, labeled as θ and θ' , on the intermediate segment. If it were necessary to measure three angles in order to “show” an increase over the length of a segment, Figure 7 would have shown three angles. Defendants’ attempt to create a limitation excluding increases or variances with fewer than three different angle measurements is therefore inconsistent with the Hankh specifications.

I therefore construe “the steep angle varies / increases [in the proximal direction] along the truncated conical segment / truncated conical portion / second tubular segment [in the longitudinal / proximal direction]” to mean “the angles formed by crossing strands and oriented in the same axial direction vary / increase [in the proximal direction] along the truncated conical segment / truncated conical portion / second tubular segment [in the longitudinal / proximal direction].”

5. "strand," and "a first strand and a second strand"

Claims within both of the Hankh Patents describe the structure as made of "strands" and refer to "a first strand . . . and a second strand" Plaintiffs contend that "strand" means "wire or portion of wire" and that "a first strand . . . and a second strand" refers to "a first portion of wire . . . and a second portion of wire." Defendants contend that "strand" means "strand or filament" and that "a first strand . . . and a second strand" refers to "two separate strands or two separate filaments."

Defendants argue that "strand" should be construed to mean "strand or filament" because the specifications of the Hankh Patents mention "strands" when referring to a stent described by U.S. Patent No. 5,064,435 ("Porter Patent"), *see, e.g.*, '810 Patent at 1:60-64, and the Porter Patent uses the terms "strand" and "filament" interchangeably. However, Defendants do not point to any use by the applicants of the term "filament" or any adoption by the applicants of that term as a synonym for "strand." Nor do Defendants explain how adding "or filament" clarifies any ambiguity or resolves any dispute, especially considering that Defendants have not defined the term "filament." Defining "strand" to mean "strand or filament" merely adds a second term, both of which by definition lacking in clarity. Absent further explanation in support of adopting

the definition "strand or filament," I do not find Defendants' argument compelling.

Yet Plaintiffs' argument in support of the construction "wire or portion of wire" is no more compelling. Plaintiffs state that because the specifications note that, in one preferred embodiment, "the tubular wall is composed of a first plurality of parallel spring stainless steel wires," '810 Patent at 5:63-64; '015 Patent at 5:65-66, and because claims in both of the Hankh Patents describe a stent wherein the tubular wall is "formed of at least one strand of a resilient material," '810 Patent at 10:37-38; '015 Patent at 9:2-3, therefore a "strand" means a "portion of wire." However, the Federal Circuit has "cautioned against limiting the claimed invention to preferred embodiments," *Teleflex, Inc. v. Ficosa North America Corp.*, 299 F.3d 1313, 1328 (Fed. Cir. 2002) (quoting *Comark*, 156 F.3d at 1186), and I will not do so here.

The parties dispute the import of Claim 27 of the '810 Patent for the construction of the term "strand." Claim 26 describes a self-expandable tubular wall as "formed of at least one strand of a resilient material." '810 Patent at 10:37-38, and dependent Claim 27 teaches:

The stent of claim 26 wherein: the at least [sic] one strand of a resilient material comprises at least a first strand wound helically in a first direction, and a second strand wound helically in a second direction different from the first direction.

Id. at 10:39-42. Plaintiffs contend that "at least one strand" necessarily includes the possibility of one strand, and that therefore Claim 27 contemplates a situation in which one strand is itself composed of multiple strands. They conclude that "strand" should be construed to mean "*portion of wire*," because one portion of wire can be composed of several smaller portions. Defendants, by contrast, argue that "at least one strand" must mean "*one or more strands*," and argue that Claim 27 describes a situation where there is more than one strand.

Both parties present plausible readings of Claim 27. Neither party points to any other claims, prosecution history, or extrinsic evidence to interpret this ambiguous claim. In light of the "equal choice between a broader and a narrower meaning of the claim," the Federal Circuit has advised that "the notice function of the claim [is] best served by adopting the narrower meaning." *Athletic Alternatives*, 73 F.3d at 1581. Thus, absent any other evidence in support of either interpretation, I will not adopt Plaintiffs' proposed definition that "strand" be construed as a "portion" of something and instead clarify as Defendants do that two strands means two *separate* strands.

In light of the above reasoning, I find that "strand" does not need construction, and that "first strand . . . and a second

strand" means "two separate strands, a first strand . . . and a second strand."

6. "radial force"

The claims of both of the Hankh Patents refer to the "radial force" of the stent and make comparisons regarding the "radial force" at different points of the stent. Plaintiffs contend that "radial force" should be construed to mean the "outward force in a radial direction upon compression." Defendants contend that the phrase cannot be construed.

Defendants rely on (1) the affidavit of their expert, Dr. David Ku, a professor of mechanical engineering and surgery who has invented various medical devices; (2) the deposition testimony Plaintiff's expert, Dr. Claude Clerc, a Senior Research and Development Fellow at Boston Scientific; and (3) the deposition testimony of Plaintiffs' Rule 30(b)(6) witness, Mr. Gary Jordan, Director of Research and Development at Boston Scientific.

Dr. Ku states that the term "radial force" is ambiguous because radial force is (in this context) exerted in response to other forces, and here the magnitude and nature of the forces being applied to the stent are unknown. He states that the magnitude of radial force depends on how the force is measured. For instance, one could compare distributed forces at equal strains, distributed forces at equal compressed diameters, or

distributed forces at equal compression diameters. The relative measurements of force may differ depending on how the comparison is made. Finally, he states that "radial force" is ambiguous because Hankh does not describe a specific method for determining or comparing radial force.

However, one of Plaintiffs' experts, Dr. Taylor, states that Dr. Ku's affidavit describes radial force only as understood generally in the engineering arts rather than as it would be understood by a person of ordinary skill in the specific art relevant to this action: stent design and construction. Dr. Taylor states that the Hankh invention deals only with an increase in radial force over particular portions of the stent, which does not require a measurement of a particular magnitude at a particular place and time, but instead requires only comparative measurement. He explains that "[s]tent designers and physicians . . . understand that stents are evaluated, characterized, and understood based on what happens in a vessel of uniform diameter." There is [no] a uniform test used to compare relative radial forces, because "[t]o characterize a stent in the innumerable conditions in which it could be deployed would be impractical and is not generally expected."

Dr. Taylor explains that "[i]n the context of a stent having a differential geometry, such as the Hankh stent, one

would understand that 'radial force' would be characterized by the effect of placing it in a uniform vessel that is smaller than the diameter of the smallest segment." Similarly, when comparing "two stents with different mechanical properties," stent designers "would use a uniform vessel" in order "to show a relative difference." When "such an understanding of how to measure the claimed" forces is "within the scope of knowledge possessed by one of ordinary skill in the art, there is no requirement for the specification to identify a particular measurement technique." *Ethicon Endo-Surgery, Inc. v. Covidien, Inc.*, 796 F.3d 1312, 1319 (Fed. Cir. 2015). In support of his affidavit, Dr. Taylor submitted three documents from Defendants' own websites or papers, each of which used the term "radial force" without including all of the limiting explanatory factors that Dr. Ku claims would be necessary to render the term comprehensible.

Defendants and Dr. Ku do not refute Dr. Taylor's assertions regarding the ways in which comparative radial force is determined in the field of medical stents. They merely counter by submitting excerpts from testimony by Dr. Clerc and Mr. Jordan - omitting the various objections that Plaintiffs' counsel raised - in which they agree that there is no *engineering* standard to measure radial force and that different methods of measurement might result in different results. Even

assuming that this testimony is admissible over Plaintiffs' objections - which Defendants do not address - this argument merely repeats Defendants' earlier error, referring only to "radial force" generically, as an engineering term, rather than in the way in which a person of ordinary skill in the art of medical stents would understand it. It is this field that the Hankh Patents address. Therefore, I do not find the phrase "radial force" to be indefinite. Instead, in light of Dr. Taylor's affidavit, I construe the phrase to mean "outward force in a radial direction upon compression, where comparison of that force in the segments of a stent with differential geometry is conducted by observing the relative radial forces of the segments when placed in a uniform vessel that is smaller than the diameter of the smallest segment." This construction clarifies the ambiguities that concern Defendants sufficiently that a factfinder may understand how the term would be understood by one of ordinary skill in the relevant art.

7. "wound helically," "wound in opposite directions," and "a strand wound helically in a direction [different from the first direction]"

Claims in both of the Hankh Patents describe strands making up the stent walls that are "wound." Plaintiffs construe "wound helically" to mean "wound to approximate a helix (i.e. to approximate a spiral form or structure)"; Defendants construe the phrase to mean "wound in a smooth, continuously-spiraling,

three-dimensional curve that lies on a cylinder or cone and follows a path having one of either a consistent left-handed or right-handed screwing motion." Plaintiffs construe "wound in opposite directions" to mean "wound in one helical direction and in the other helical direction, respectively"; Defendants construe the phrase to mean "wound helically in opposite-handed screwing motions." The Plaintiffs construe "a . . . strand wound helically in a . . . direction [different from the first direction]" to mean "a first wire or first portion of wire wound helically in a first direction and a second wire or second portion of wire wound helically in a second direction different [than/from] the first direction"; Defendants construe the phrase to mean "a . . . strand wound helically in a . . . direction [that is the opposite handed screwing motion from the first direction]."

This is essentially the same dispute the Parties had regarding "helical" and related terms in the Pulnev Patents, see *supra* Section III(A) (3). Both parties raise the same dictionary definitions that they raise with respect to the Pulnev Patents, again without any articulation why one definition should be superior to another in the context of medical stents. Defendants contend that the examples depict only smooth, continuous helical windings, ignoring the principle of claim construction prohibiting the importation of limitations into the

claims based on particular embodiments described in a specification. They contend that the use of words such as "wound" and "direction" indicates that their definition is correct, although even a line that substantially follows a helical line is wound in a particular direction as well. They further contend that the distinction between a zig-zag and a helix supports their definition, although a line following a substantially helical path may still be differentiated from a zig-zag.

For their part, Plaintiffs point to the use of "helical" in the specifications and state that it is "consistent" with their definitions, apparently ignoring the fact that it is equally "consistent" Defendants's proposed definitions.

In short, the intrinsic evidence is inconclusive. Just as I rely on Dr. Taylor's affidavit to construe the term in the context of the Pulnev Patents, so too I rely on it here. He states that "helical" is used in the stent art to refer to a variety of configurations and does not imply the limitations that Defendants propose. I construe "wound helically" to mean "wound substantially in the form of a spiral."

In light of this construction, I will also reject Defendants' proposed definitions of the related phrases, which incorporate the idea that a strand wound helically must smoothly and continuously curve in a consistent screwing motion.

Instead, I will construe the terms as Plaintiffs have proposed, with a few exceptions. I have rejected Plaintiffs' construction of "strand" (meaning "wire or first portion of wire") and will not incorporate that construction into the definitions of the phrases at issue. Nor will I adopt Plaintiffs' conclusion that the difference between "opposite" and "different" helical directions should be maintained. Under the doctrine of claim differentiation, the terms should be construed to differ, because Claim 10 of the '810 Patent describes strands wound helically in "different" directions, '810 Patent at 9:1-5, and dependent Claim 11 states that "the first and second strand are wound in opposite directions." *Id.* at 9:6-8. However, I am aware of only two helical directions (what could be called, roughly, clockwise and counter-clockwise), and neither Plaintiffs nor their expert have explained what any other "different" helical direction might be or how the understanding of these terms might differ in the helical arts from the common understanding.⁷

⁷ Indeed, Plaintiffs' proposed definition of "wound in opposite directions," is "wound in one helical direction and in *the* other helical direction, respectively." (emphasis added). The use of the definite article "the" rather than an indefinite article such as "an" necessarily suggests that Plaintiffs understood only two helical directions rather than three or more possibilities. With this construction, Plaintiffs' suggested construction belies their argument and implies that "different" and "opposite" should be construed as synonymous.

For these reasons, I construe "wound in opposite directions" to mean "wound in one helical direction and in the other helical direction, respectively"; and "a . . . strand wound helically in a . . . direction different [than/from] the first direction" to mean "a . . . strand wound helically in the opposite helical direction [than/from] the first direction."

8. "interbraided"

Claim 11 of the '015 Patent describes a stent in which the tubular wall is made of strands wherein "the first and second strands are wound in opposite directions and interbraided with one another." '015 Patent at 9:10-11. Plaintiffs contend that "interbraided" means "braided." Defendants contend that the term means "arrangement in which a strand continuing in a direction passes alternately over and under each successively encountered strand."

As with the immediately preceding dispute regarding "wound helically," this dispute over "interbraided" as used in the Hankh Patents substantially tracks the disputes over the analogous language in the Pulnev Patents. As before, Defendants' proposed limitations are not rooted in the intrinsic evidence. See *supra* Section III(A)(3)-(4). Defendants assert that because the Hankh Patents describe Figure 2 as disclosing a "braided structure" involving a set of wires wound helically in "a first direction" and a set of wires wound helically "in a

second direction," see, e.g., '810 Patent at 5:60-6:7, therefore all "interbraided" strands must continue in a given direction. Similarly, they contend that the arrangement apparent in Figure 2 whereby a strand passes alternately over and under each successively encountered strand supports their proposed limitation regarding the pattern of the "interbraided" arrangement. This logic inappropriately imposes the characteristics of a particular embodiment as limitations on the claims. See *Acumed LLC v. Stryker Corp.*, 483 F.3d 800, 805 (Fed. Cir. 2007) ("That assertion is flawed: it is an attempt to import a feature from a preferred embodiment into the claims.").

Neither the claims nor the specifications require any particular pattern of "interbraiding." Instead, the specifications explicitly state that Figure 2 represents only one particular embodiment. They explain:

The braided structure [in Figure 2] assures contraction of the stent in the radial direction when the two ends 4 and 5 of the stent are pulled away from one another . . . and self-expansion of the stent in the radial direction when the pull according to arrows is released Of course, *other known braidings or patterns* providing the same effect may be used.

See, e.g., '810 Patent at 5:67-6:7. The specifications of the Hankh Patents are clear that more than one pattern may constitute "braiding" and that Defendants' proposed limitations are unwarranted.

Plaintiffs' construction, while not inaccurate, would be misleading to a layperson. Plaintiffs note that the Hankh specifications use the phrases "braided tubular wall" and "braided structure." In particular, the specifications state that "[t]his invention relates to a stent for use in a body passageway, comprising a flexible self-expandable braided tubular wall." See, e.g., '810 at 1:9-11. The Plaintiffs therefore propose that "interbraided" be construed as "braided." The difficulty is that, in the common parlance, "braid" means "to form (three or more strands) into a cord or ribbon by repeated crossing left and then a right strand over a central strand and under an opposite strand." *Webster's Third* 266. Plaintiffs' proposed construction only replaces one term with another term that similarly requires construction in order for a layperson to understand it in the same manner as it would be understood by a person of ordinary skill in the art.

In light of the difficulties plaguing both proposed definitions, I adopt the only definition available from the specifications, which I have quoted above. I construe "interbraided" to mean "interbraided in any number of braidings or patterns providing the effect that the stent contracts in the radial direction when the ends of the stent are pulled away from each other and the stent self-expands in the radial direction when the pull is released." This construction retains the term

"interbraided," clarifies that no particular pattern is required, and includes the one limitation stated in the specifications.

9. "are selected to facilitate a placement of the tubular wall at a junction of the esophagus with the stomach"

Claims 7 and 31 of the '810 Patent teach a stent in which the diameters of the proximal and distal segments "are selected to facilitate a placement of the tubular wall at a junction of the esophagus with the stomach." '810 Patent at 8:59-61, 10:57-59. Plaintiffs contend that the phrase requires no construction. Defendants contend that the phrase is indefinite and cannot be construed.

Defendants argue that the term is indefinite because neither the claims nor the specification of the '810 Patent explain how to select diameters that facilitate a placement of the tubular wall at the junction of the esophagus and the stomach. They note that the '810 Patent does not describe the characteristics of the junction of the esophagus and the stomach or how one might use this knowledge to select the correct diameters. They contend that without this information, it is impossible to determine whether a stent design meets this limitation.

This argument ignores again one of the most basic principals of patent law: that the relevant inquiry is not

whether a layperson would understand the claims, but rather whether "one skilled in the art would understand the bounds of the claim when read in light of the specification"

Exxon Research & Engineering Co. v. United States, 265 F.3d 1371, 1375 (Fed. Cir. 2001). Plaintiffs' expert, Dr. Taylor, states in his affidavit that stent designers "understand the range of stent diameters that would be appropriate for the particular anatomy in which a stent is to be deployed," and that "the normal sizes for the relevant human anatomies fall within a known spectrum, and a stent designer would choose stent diameters accordingly." Defendants present no evidence to counter this seemingly obvious proposition, that persons having ordinary skill in designing medical stents would have a background in and understanding of the particular anatomies for which the stents are designed, in this case: the juncture of the esophagus and the stomach.

In the alternative, Defendants argue that "to the extent this phrase requires a *selection* of diameters to facilitate placement at a *particular* 'junction of the esophagus with the stomach' (i.e., in a particular patient)," the phrase would be indefinite under the holding of *IPXL Holdings, L.L.C., v. Amazon.com, Inc.*, 430 F.3d 1377 (Fed. Cir. 2005). In *IPXL*, the Federal Circuit held that a claim is indefinite if it "attempts to claim both a system and a method for using that system."

IPXL Holdings, 430 F.3d at 1383-84. "The conclusion of *IPXL Holdings* was based on the lack of clarity as to when the mixed subject matter claim would be infringed." *Microprocessor Enhancement Corp. v. Texas Instruments, Inc.*, 520 F.3d 1367, 1374 (Fed. Cir. 2008). Because the claim in *IPXL* included both a system and a method for using the system, it was not clear whether the claim would be infringed at the time of manufacture and sale or at the time of use. The claim was therefore held indefinite. *IPXL Holdings*, 430 F.3d at 1383-84.

In *IPXL*, the "method" language inserted in the "system" claim was problematic because it was "directed to user actions, not system capabilities." *In re Katz Interactive Call Processing Patent Litig.*, 639 F.3d 1303, 1318 (Fed. Cir. 2011). The question in the instant case is therefore whether "are selected" refers to (1) selection by the stent designer and manufacturer, who know the range of stent diameters appropriate for the junction of the stomach and the esophagus - thus relating the selection to "system capabilities"; or (2) selection by an individual doctor, who picks the stent for implantation in a particular patient - thus relating the selection to "user actions." On close examination of the language of the claim, it is apparent the selection described is performed by the designer or manufacturer.

The claim describes diameters that "are selected to facilitate a placement of the tubular wall at a junction of *the* esophagus with *the* stomach." The definite article used to describe the organs involved ("*the* esophagus", "*the* stomach") describes the specific classes of organs, instead of the organs of a particular patient, because no individual patient is identified. The Claim does not use an indefinite article, which would indicate that the stomach and esophagus involved could be any stomach or esophagus being treated by the physician ("*an* esophagus," "*a* stomach"). In light of this choice of phrasing, the claim relates to general compatibility with the junction of the esophagus with the stomach and not the user actions of a treating physician. The claim is therefore "directed to system capabilities." *In re Katz Interactive Call Processing Patent Litig.*, 639 F.3d at 1318. No component of the claim establishes a "method" and the claim is not indefinite within the holding of *IPXL Holdings*.

Given the careful grammatical parsing necessary to determine whether the claim is indefinite, I will construe the phrase to make its grammatical import clear. I construe it to mean "selected by the designer or manufacturer to facilitate a placement of the tubular wall at a junction of the esophagus with the stomach."

C. The Thompson Patent

1. "circumscribing the stent over substantially the entirety of said axial length"

Claims 1, 19, and 23 of the Thompson Patent describe a continuous film as "circumscribing the stent over substantially the entirety of said axial length." Thompson Patent at 10:46-47, 12:38-40, 13:6-7. Plaintiffs contend that this phrase should be construed to mean "completely covering the stent over a substantial amount of the entire axial length of the film." Defendants contend that it should be construed to mean "completely covering the stent with an outer diameter that is continuously equal to or greater than the outer diameter of the stent, over a substantial amount of the entire axial length of the film." The parties' dispute is solely related to whether "circumscribing" implies that the film has "an outer diameter that is continuously equal to or greater than the outer diameter of the stent."

The Thompson specification states that "[t]he continuous film substantially prevents growth of tissue through the stent along the barrier region." Thompson Patent at 3:22-23. Defendants argue that the only way a film can prevent tissue growth through the stent is if its outer diameter is equal to or greater than that of the stent. However, they provide no expert opinion to that effect, and Plaintiffs' expert Dr. Taylor states

that if the film were disposed on the interior side of the stent wall, it would still be considered to block the openings so that the tissue could not grow through the stent. Taylor Reply Affidavit ¶ 42. Dr. Taylor's statement is consistent with the specification, which only states that the film "substantially" prevents the tissue growth rather than that it completely prevents tissue growth from encroaching through the stent in any way. Thompson Patent at 3:22. A film circumscribing the stent around the outside of the stent walls would completely prevent the tissue from reaching the stent along the barrier region, but the specification does not require such complete prevention.

Defendants additionally argue that their proposed definition is consistent with the ordinary meaning of "circumscribe." They point to the definition in *Webster's College Dictionary* 247 of "circumscribe" as "to draw a line around; encircle" and they point to an illustration on the website emathzone.com of a circle "circumscribing a polygon" in which the circle is around the exterior of the polygon. However, this offer of an "ordinary meaning" of "circumscribe" is narrower than the meaning of the term as it is used in the Thompson Patent.⁸

⁸ It is even narrower than Defendants' proposed definition, which describes only the "outer diameter" of the film, leaving vague whether the "inner diameter" might be less than the diameter of the stent. This careful wording was presumably adopted in order

The Thompson specification explains that the medial region of the stent can be circumscribed with film "by dip coating of [the] stent" Thompson Patent at 8:47. The specification provides some detail regarding the dip-coating process, explaining that the film must be removed from the cuff after dipping, and describing how many dip coatings are necessary to achieve the preferred film thickness. *Id.* at 8:48-54. However, the specification does not suggest that the dipping must be conducted in a particular way to ensure that the coating is only around the outside of the stent. Dr. Taylor states in his affidavit that depending on the dip-coating process, a film can be disposed on the stent exterior, interior, or both. Taylor Reply Affidavit at ¶ 44.

Because dip coating is an appropriate means of circumscription, which is clear from the Thompson specification, "circumscription" does not require the film to be disposed solely on the exterior of the stent. The "ordinary meanings" of "circumscribe" demonstrated by the dictionary definition and the emathzone.com diagram therefore do not apply in the context of the Thompson Patent. Indeed, given Defendants' proposed definition, citing only to the "outer diameter" of the film,

to avoid contradicting the specification in the same manner as the proffered "ordinary meaning" does.

which does not adopt the "ordinary meaning," it appears that they too agree that the "ordinary meaning" is too narrow.

Finally, Defendants contend that their construction is supported by the claim language. Claim 1 states that the film is "formed axially along the stent and ha[s] an axial length." *Id.* Defendants state that "[t]his feature refers to a film covering the stent over a length of the stent." They argue that "[i]f the word 'circumscribes' simply meant 'covering,' . . . there would be no need to add this limitation, because the preceding claim language already called for a film covering the stent." However, the "preceding claim language" did *not* "call[] for a film covering the stent." It stated that the film is "formed axially along the stent and ha[s] an axial length." Defendants baselessly interpret one part of a claim to state something far broader than it does and then argue that the second part of the claim must be construed in light of this overly broad interpretation. Defendants have put forth no compelling argument to construe "formed axially along the stent and ha[s] an axial length" to mean "covering." Thus, this line of reasoning fails.⁹

⁹ Defendants apparently also argue - though it is by no means clear - that because the film circumscribes the stent over substantially the entirety of the axial length of the film, this "reinforces the notion that 'circumscribing' should be given the meaning proposed by Defendants." There does not appear to be any relationship between whether the film may only circumscribe

Defendants have not demonstrated that the claim language should be construed to include the proposed limitation regarding the outer diameter of the film, where the limitation is not included within the claims nor implied by intrinsic or extrinsic evidence. I therefore adopt Plaintiffs' definition and construe "circumscribing the stent over substantially the entirety of said axial length" to mean "completely covering the stent over a substantial amount of the entire axial length of the film."

2. "open weave construction"

Claims 1, 19, and 23 of the Thompson Patent describe "a tubular stent of open weave construction" Thompson Patent at 10:39, 12:30, 12:63. Plaintiffs contend that "open weave construction" requires no further definition. Defendants contend that the phrase should be construed to mean "constructed of two or more separate strands woven together."

The parties' dispute is directed to whether "open weave construction" implies a requirement of multiple separate strands. Defendants offer three arguments in favor of such an implication.

the stent over a partial length of the film and whether circumscription can occur along the internal wall of the stent. Nor have Defendants explained what that relationship might be. This argument is vague and incomplete and, therefore, unavailing.

First, Defendants contend that “[t]he specification contemplates only one way to make an open weave construction - by weaving two or more separate strands together.” They state that the specification describes such a construction as the preferable embodiment of the stent. I am forced to repeat, once again, that a party may “narrow a claim term’s ordinary meaning, but he cannot do so simply by pointing to the preferred embodiment” *CCS Fitness, Inc.*, 288 F.3d at 1366.

Second, Defendants contend that “open weave construction” must imply that two or more strands are woven together because the specification provides that the “stent is preferably of open weave or mesh construction, formed of multiple helically wound strands or filaments of a flexible material such as a body compatible stainless steel.” Thompson Patent at 5:67-7:3. However, it is clear from the sentence that the specification is describing a particular type of open weave construction, not defining the phrase. As a general matter, it is implausible to argue that every embodiment of open weave or mesh construction must be made of helices and of a flexible material.

An application of the doctrine of claim differentiation to the Thompson Patent demonstrates that such an argument is no more plausible in the context of this particular patent. Claim 1 teaches a stent of “open weave construction,” *id.* at 10:53, while Claim 7, which is dependent on Claim 1, teaches that “the

stent comprises a mesh formed of braided helical strands," *id.* at 11:13-14. If the description of the open weave or mesh construction in the specification were intended as a definition, instead of an illustration of one particular type of that construction, then Claim 7 would be redundant. Defendants have "not shown any reason sufficient to rebut the presumption that claim 1 should not be . . . limited in order to preserve the distinction" of Claim 7. *Comark*, 156 F.3d at 1187.

Third and finally, Defendants contend that the prosecution history supports their construction because the applicants described the stent segments in U.S. Patent No. 5,064,435 ("Porter Patent") as "unequivocally open weave" and the Porter Patent itself describes a "[s]tent . . . [that] has an open mesh or weave construction, formed of helically wound and braided strands or filaments . . . of a resilient material." Porter Patent at 5:7-10. However, Defendants do not demonstrate that the applicants purported to adopt every definition applied in the Porter Patents to the claims in the Thompson Patent. Moreover, Defendants do not demonstrate that the description in the Porter Patent of the "open mesh or weave construction" was anything other than an illustration of a particular embodiment.

Plaintiffs' expert, Dr. Taylor, has stated that he (as a person of ordinary skill in the art) would not understand the term to place a limitation on the number of strands that may be

used in general or to exclude stents woven from a single strand in particular. Taylor Reply Affidavit ¶ 46. Defendants have not shown that "open weave" should be construed to imply that more than one strand must be woven together. Nor have they shown that any other aspect of the phrase "open weave construction" is ambiguous or misleading. The phrase does not need construction.

3. "braided helical strands"

Claims 7 and 10 of the Thompson Patent teach a stent that is "formed of braided helical strands." Thompson Patent at 11:8-9, 11:25. Plaintiffs contend that "braided helical strands" should be construed to mean "braided helical (i.e., approximating a spiral form or structure) strands." Defendants contend that the phrase should be construed to mean "two or more separate strands braided together to form braided helices." The parties' dispute concerns (1) whether "helical" should be construed broadly, to mean approximating a helix, or narrowly, to mean forming a helix, and (2) whether the braids must have multiple, separate strands.

Defendants base their proposed construction of "helical" on a dictionary definition. They cite the same definition from *Webster's Third Dictionary* that they cite to construe "helical" in the context of both the Pulnev and the Hankh Patents. Once again, Plaintiffs base their definition on the statements of Dr.

Taylor, their expert witness. Dr. Taylor explains that in the context of stent construction, "helical" is used in a general way to encompass many different configurations, reflecting what he calls "its meaning in the lay context" of "approximating a spiral form or structure." For the same reasons that I discuss above with reference to the term "helical" as used in the Pulnev and the Hankh Patents, I find that "helical" here means "substantially in the form of a spiral." See *supra* Sections III(A) (3); III(B) (7).

Defendants contend that the specification's descriptions of one embodiment as "comprised of multiple braided and helically wound strands," Thompson Patent at 8:30-32, and of another embodiment as containing "points or edges at the opposite ends of the stent," *id.* at 8:26-28, serve to define the term "braided strands." This argument once again improperly imports the characteristic of an illustrative embodiment into the claims.

However, the language in the specification does offer relevant guidance. I disagree with Plaintiffs' assertion that there is no intrinsic evidence suggesting that the braided helical strands are formed by two or more separate helical strands. The specification describes braided helical strands by using different phrases interchangeably, indicating that those phrases are synonymous for the purposes of the Patent. The

choice of interchangeable language demonstrates that the applicants intended "braided helical strands" to be composed of multiple separate helical strands.

The specification describes "[t]he preferred stent" as "compris[ing] a mesh formed of braided helical strands." Thompson Patent at 3:30-31. It explains regarding the embodiment labeled "66" that "[t]he stent preferably is of open weave or mesh construction, formed of multiple helically wound strands or filaments" *Id.* at 5:67-6:2. The specification then describes another stent, labeled "90," stating that "[l]ike 66, stent 90 is of mesh or open weave construction, comprised of multiple braided and helically wound strands." Thompson Patent at 8:30-32. Finally, the specification describes "a mandrel . . . particularly well suit for forming stent 90." *Id.* at 9:49-50. It states that, using this mandrel, "[t]o form the stent, *the individual filaments or strands* are wound in helical fashion to form an open weave cylinder." *Id.* at 9:52-54 (emphasis added).

The specification uses "braided helical strands," "multiple helically wound strands," "multiple braided and helically wound strands," and "individual filaments or strands that are wound in helical fashion" interchangeably to describe the preferred embodiment of the open weave or mesh structure. This indicates that the braided helical strands are (1) made of multiple

strands and (2) made of discrete ("individual") strands. The choice of language in the specification thus implies that the phrase "braided helical strands," as used in the Thompson Patent, involves multiple separate strands.

In light of the reasoning above, neither Plaintiffs' nor Defendants' proposed definition of "braided helical strands" is entirely convincing. Instead, I construe "braided helical strands" to mean "braids of two or more separate strands where each strand is substantially in the form of a spiral."

IV. CONCLUSION

For the reasons set out at length above, I CONSTRUE the terms of the various claims as set forth in this Memorandum, and as summarized in the Appendix, *see infra* Section V.

It is FURTHER ORDERED:

That the parties submit on or before May 6, 2016 a joint proposed scheduling order setting forth dates certain for the conclusion of discovery, summary judgment motions and any other dates necessary to be established to bring this case to judgment.

/s/ Douglas P. Woodlock

DOUGLAS P. WOODLOCK
UNITED STATES DISTRICT JUDGE

V. APPENDIX: CLAIM CONSTRUCTION SUMMARY**A. *Pulnev Patents***

Phrase(s) in Patent	thread(s)
Plaintiffs' Construction	portion(s) of wire
Defendants' Construction	thread: length of material that is not a monofilament threads: two or more threads
Court's Construction	portion(s) of wire

Phrase(s) in Patent	elongate(d) element(s) elongate member
Plaintiffs' Construction	portion(s) of wire
Defendants' Construction	elongate(d) element or elongate member: elongated length of material that is not a monofilament elongate(d) elements: two or more elongated elements / members
Court's Construction	portion(s) of wire forming the side surface

Phrase(s) in Patent	helical helix
Plaintiffs' Construction	helix: spiral form or structure helical: approximating a helix
Defendants' Construction	a smooth, continuously- spiraling, three-dimensional curve that lies on a cylinder or cone and follows a path having one of either a consistent left-handed or right-handed screwing motion
Court's Construction	helix: a spiral form helical: substantially in the form of a spiral

Phrase(s) in Patent	opposite senses of helix opposite helical lines
Plaintiffs' Construction	one helical direction and the other helical direction
Defendants' Construction	opposite handed screwing motion of the path of one helical line relative to that of another helical line
Court's Construction	one helical direction and the other helical direction

Phrase(s) in Patent	common [first/second] direction of winding
Plaintiffs' Construction	common [first / second] direction of winding
Defendants' Construction	common one direction along a helical path
Court's Construction	common [first / second] direction of winding

Phrase(s) in Patent	opposite to the first direction
Plaintiffs' Construction	in the other helical direction
Defendants' Construction	opposite handed screwing motion of the path of one helical line relative to that of another helical line
Court's Construction	in the other helical direction

Phrase(s) in Patent	interlaced interlacing pattern interwoven
Plaintiffs' Construction	interlaced: interwoven interlacing pattern: interwoven pattern interwoven: woven
Defendants' Construction	arrangement in which a length of thread passes alternatively over and under each successively encountered length of thread
Court's Construction	interlaced: interwoven interlacing pattern: interwoven pattern interwoven: interwoven

Phrase(s) in Patent	configured to slide with respect to one another
Plaintiffs' Construction	not fixedly secured with respect to one another
Defendants' Construction	configured to move along the length with respect to one another
Court's Construction	configured to move in a smooth continuous motion with respect to one another without being fixedly secured to one another

Phrase(s) in Patent	a shape and orientation substantially different from shape and orientation of any of the elongated elements
Plaintiffs' Construction	a shape and orientation substantially different than that of any portions of wire along the body
Defendants' Construction	term cannot be construed
Court's Construction	a shape and orientation substantially different from shape and orientation of any of the portions of wire forming the side surface

Phrase(s) in Patent	free ends said first and second ends
Plaintiffs' Construction	free ends: free ends said first and second ends: said first and second ends
Defendants' Construction	the portion of the thread / elongate member that extends between that thread's / elongate member's last cross of an oppositely directed thread / elongate member and its tip
Court's Construction	free ends: free ends said first and second ends: said first and second ends

Phrase(s) in Patent	mesh structure
Plaintiffs' Construction	structure forming a net or network
Defendants' Construction	a pattern of openings made by an arrangement or interlaced helical threads
Court's Construction	mesh structure

Phrase(s) in Patent	merging sections bending points bend(s) connecting elements curvilinear segment circle arc segment
Plaintiffs' Construction	merging sections: sections of the portion of wire at the body ends bending points: locations of bending bend(s): shape(s) resulting from having been bent connecting elements: connecting (v.) portions of wire curvilinear segment: curved portion of wire circle arc segment: portion of wire having the shape of a part of a circle
Defendants' Construction	a section that connects oppositely wound thread segments in a smooth, continuous, non-angular fashion, so as to have a circle arc, loop or U-shape
Court's Construction	merging sections: merging sections bending points: locations of bending bend(s): shape(s) resulting from having been bent connecting elements: that connects portions of wire curvilinear segment: curved segment circle arc segment: segment having the shape of a part of a circle

B. Hankh Patents

Phrase(s) in Patent	truncated conical segment truncated conical portion
Plaintiffs' Construction	truncated segment having an incline or taper (as differentiated from an abrupt, stepped transition)
Defendants' Construction	a segment having a gradual, non-abrupt incline or taper consistent with a solid formed by rotating a right triangle about one of its sides, with the apex cut off by a plane parallel to the base of the segment, where the segment extends a non-trivial length that spans at least two axially aligned mesh openings
Court's Construction	segment having a gradual, non-abrupt incline or taper consistent with a solid formed by rotating a right triangle about one of its sides, with the apex cut off by a plane parallel to the base of the segment

Phrase(s) in Patent	intermediate segment second tubular segment
Plaintiffs' Construction	intermediate segment: intermediate segment second tubular segment: second tubular segment
Defendants' Construction	a segment having one or more gradual, non-abrupt inclines or tapers consistent with a solid formed by rotating a right triangle about one of its sides, with the apex of each incline or taper cut off by a plane parallel to the base of the segment, wherein the segment extends a non-trivial length that spans at least two axially aligned mesh openings
Court's Construction	intermediate segment: intermediate segment second tubular segment: second tubular segment

Phrase(s) in Patent	distal segment third tubular segment
Plaintiffs' Construction	distal segment: distal segment third tubular segment: third tubular segment
Defendants' Construction	a segment at the distal end of the stent
Court's Construction	distal segment: a segment at the distal end of the stent third tubular segment: third tubular segment

Phrase(s) in Patent	the steep angle varies / increases [in the proximal direction] along the truncated conical segment / truncated conical portion / second tubular segment [in the longitudinal / proximal direction]
Plaintiffs' Construction	the steep angle varies / increases along the truncated conical segment / truncated conical portion / second tubular segment in the longitudinal direction
Defendants' Construction	the strands cross within the truncated conical segment / truncated conical portion to form at least three angles that are oriented in the same axial direction and bisected by the same line, and the angles change / become greater from one to the next
Court's Construction	the angles formed by crossing strands and oriented in the same axial direction vary / increase [in the proximal direction] along the truncated conical segment / truncated conical portion / second tubular segment [in the longitudinal / proximal direction].

Phrase(s) in Patent	strand a first strand . . . and a second strand
Plaintiffs' Construction	strand: wire or portion of wire a first strand . . . and a second strand: a first wire or first portion of wire . . . and a second wire or second portion of wire
Defendants' Construction	strand: strand or filament a first strand . . . and a second strand: two separate strands or two separate filaments
Court's Construction	strand: strand a first strand . . . and a second strand: two separate strands, a first strand . . . and a second strand

Phrase(s) in Patent	radial force
Plaintiffs' Construction	outward force in a radial direction upon compression
Defendants' Construction	term cannot be construed
Court's Construction	outward force in a radial direction upon compression, where comparison of that force in the segments of a stent with differential geometry is conducted by observing the relative radial forces of the segments when placed in a uniform vessel that is smaller than the diameter of the smallest segment

Phrase(s) in Patent	wound helically
Plaintiffs' Construction	wound to approximate a helix (<i>i.e.</i> , to approximate a spiral form or structure)
Defendants' Construction	wound in a smooth, continuously-spiraling, three-dimensional curve that lies on a cylinder or cone and follows a path having one of either a consistent left-handed or right-handed screwing motion
Court's Construction	wound substantially in the form of a spiral

Phrase(s) in Patent	wound in opposite directions
Plaintiffs' Construction	wound in one helical direction and the other helical direction, respectively
Defendants' Construction	wound helically in opposite handed screwing motions
Court's Construction	wound in one helical direction and in the other helical direction, respectively

Phrase(s) in Patent	a . . . strand wound helically in a . . . direction different than / from the first direction
Plaintiffs' Construction	a first wire or first portion of wire wound helically in a first direction and a second wire or second portion of wire wound helically in a second direction different than / from the first direction
Defendants' Construction	a . . . strand wound helically in a . . . direction that is the opposite handed screwing motion from the first direction
Court's Construction	a . . . strand wound helically in the opposite helical direction [than/from] the first direction

Phrase(s) in Patent	interbraided
Plaintiffs' Construction	braided
Defendants' Construction	arrangement in which a strand continuing in a direction passes alternately over and under each successively encountered strand
Court's Construction	interbraided in any number of braidings or patterns providing the effect that the stent contracts in the radial direction when the ends of the stent are pulled away from each other and the stent self-expands in the radial direction when the pull is released

Phrase(s) in Patent	are selected to facilitate a placement of the tubular wall at a junction of the esophagus with the stomach
Plaintiffs' Construction	are selected to facilitate a placement of the tubular wall at a junction of the esophagus with the stomach
Defendants' Construction	term cannot be construed
Court's Construction	selected by the designer or manufacturer to facilitate a placement of the tubular wall at a junction of the esophagus with the stomach

C. Thompson Patent

Phrase(s) in Patent	circumscribing the stent over substantially the entirety of said axial length
Plaintiffs' Construction	completely covering the stent over a substantial amount of the entire axial length of the film
Defendants' Construction	completely covering the stent with an outer diameter that is continuously equal to or greater than the outer diameter of the stent, over a substantial amount of the entire axial length of the film
Court's Construction	completely covering the stent over a substantial amount of the entire axial length of the film

Phrase(s) in Patent	open weave construction
Plaintiffs' Construction	open weave construction
Defendants' Construction	constructed of two or more separate strands woven together
Court's Construction	open weave construction

Phrase(s) in Patent	braided helical strands
Plaintiffs' Construction	braided helical (<i>i.e.</i> , approximating a spiral form or structure) strands
Defendants' Construction	two or more separate strands braided together to form braided helices
Court's Construction	braids of two or more separate strands where each strand is substantially in the form of a spiral